



ESTIMATED WATER USE IN NEBRASKA 1 9 9 5

April 1998

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DEDICATION

This report is dedicated to Jerry Wallin who retired from the Natural Resources Commission on May 31, 1997 after over 27 years of service. As Head of the Commission's Comprehensive Planning Section Jerry helped coordinate efforts on a variety of reports and provided invaluable work on this volume.

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<http://www.nrc.state.ne.us>

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GLOSSARY

The terminology used by the U.S. Geological Survey in its series of reports on water use has evolved since 1950. Definitions of terms used in this report follow their usage in the 1990 national report.

acre-foot - the volume of water required to cover 1 acre of land to a depth of 1 foot; equal to 43,560 cubic feet or about 326,000 gallons.

aquifer - a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

consumptive use - that part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment.

conveyance loss water - that is lost in transit from a pipe, canal, conduit, or ditch by leakage or evaporation. Generally, the water is not available for the intended use; however, leakage from an irrigation ditch, for example, may percolate to a ground-water source and be available for further use.

cooling water - water used for cooling purposes, such as cooling condensers and nuclear reactors.

domestic water use - water for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens.

evapotranspiration (ET) - a collective term that includes water discharged to the atmosphere as a result of evaporation from the soil and surface-water bodies and as a result of plant transpiration.

fossil-fuel power - electric power generated using fossil fuel (coal, oil, or natural gas).

gigawatthour (GWh) - a unit of energy equivalent to one billion watthours.

ground water - generally, all subsurface water as distinct from surface water; specifically, that part of the subsurface water in the saturated zone (a zone in which all voids are filled with water).

hydroelectric power water use - the use of falling water to drive turbines and generate electric power; usually an instream use.

hydrologic unit - a geographic area representing part or all of a surface-drainage basin or distinct hydrologic feature as delineated by the U.S. Geological Survey on State Hydrologic Unit Maps; each hydrologic unit is identified by an eight-digit number, the first four digits of which denote the region and subregion containing the unit.

instream water use - water that is used, but not withdrawn, from a ground- or surface-water source for such purposes as hydroelectric power generation, navigation, water-quality improvement, fish propagation, and recreation.

offstream water use - water withdrawn or diverted from a surface- or ground-water source for public water supply, industry, irrigation, livestock, thermoelectric power generation, self-supplied domestic use, and other uses.

per capita use - the average quantity of water used per person per day, in gallons per day (gal/d) per capita.

public water supply - water withdrawn by public water systems and delivered for all uses, such as domestic, commercial, thermoelectric power, industrial, and public water use.

public water use - water supplied from a public water system and used for such purposes as firefighting, street washing, and municipal parks and swimming pools.

saline water - water that contains more than 1,000 milligrams per liter of dissolved solids.

self-supplied water - water withdrawn from a surface- or ground-water source by a user rather than being obtained from a public water supply.

standard industrial classification (SIC) code - four-digit codes established by the Office of Management and Budget, used in the classification of establishments by the type of activity in which they are engaged.

subregion - geographic area representing a drainage basin or distinct hydrologic feature as delineated by the U.S. Geological Survey on State Hydrologic Unit Maps comprising one or more hydrologic units, and identified by a four-digit number, the first two digits of which identify the region containing the subregion.

surface water - an open body of water, such as a stream or a lake.

water use - (1) in a restrictive sense, the term refers to water that is actually used for a specific purpose, such as for domestic use, irrigation, or industrial processing. In this report, the quantity of water use for a specific category is the combination of self-supplied withdrawals and public-supply deliveries. (2) More broadly, water use pertains to humans' interaction with and influence on the hydrologic cycle, and includes elements such as water withdrawal, delivery, consumptive use, wastewater release, reclaimed wastewater, return flow, and instream use.

watthour (Wh) - an electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electrical circuit steadily for one hour.

CONVERSION FACTORS

MULTIPLY

BY

TO OBTAIN

Area

acre	43,560 4,047 0.001562	square feet square meters square mile
square mile (mi ²)	2.590	square kilometers

Volume

acre-foot (acre-ft)	1,233	cubic meters
inch per acre (in/acre)	2.540	meter per acres
cubic feet (ft ³)	0.02832	cubic meter
gallon (gal)	3.785	liters

Flow

million gallons per day (Mgal/d)	1.121 0.001547 0.6944	thousand acre-feet per year thousand cubic feet per second thousand gallons per minute
thousand acre-feet per year (acre-ft/yr)	0.8921 0.001380 0.6195 0.003377	million gallons per day thousand cubic feet per second thousand gallons per minute million cubic meters per day

ABSTRACT

Nebraska water use in 1995 was estimated by Federal and State agencies as part of the U.S. Geological Survey's National Water Use Information Program, which publishes national water-use data every five years. Detailed data from individual water users and public water suppliers were aggregated and merged with less-detailed estimates of all types of uses to produce county- or hydrologic unit-level estimates. Total estimated water use in Nebraska was about 28,295,800 acre-feet, which is an average use rate of 25,241.59 million gallons per day. Surface water provided 19,040.61 million gallons per day, 75.4 percent of total water use. Ground water provided 6,200.98 million gallons per day, 24.6 percent of the total.



The largest use of water, 17,354.26 million gallons per day, was for power generation. More than 99.9 percent (17,349.83 million gallons per day) of this use was from surface water. It accounted for 91.1 percent of the total surface water used. Surface water was withdrawn by public water systems for domestic, industrial, and commercial uses. It also was withdrawn for self-supplied industrial, mining, and power generation uses. Streamflow was increased in some places by municipal wastewater treatment discharges and irrigation return flow, but some surface water was lost to evaporation from reservoirs.

The largest use of water, 17,354.26 million gallons per day, was for power generation.

Irrigation was the largest use of ground water, 5,776.60 million gallons per day. It accounted for 93.1 percent of the total ground water used. Ground water provided 81.3 percent of the water withdrawn for public water supplies, 232.25 million gallons per day, and all of the self-supplied domestic use, 41.85 million gallons per day. Only 4.7 million gallons per day of saline ground water, 0.1 percent of ground-water withdrawals, were used, all for mining. Tables and choropleth maps show statewide distributions of water use by type, county, and subregion.



Irrigation was the largest use of ground water, 5,776.60 million gallons per day.

Chapter One



INTRODUCTION TO NEBRASKA AND THE WATER USE STUDY

Vast quantities of surface and ground water are used in Nebraska for a wide range of purposes. Surface water is diverted and withdrawn from streams and reservoirs for offstream uses, including hydroelectric power generation and irrigation. It is also used in streams, reservoirs, and lakes for hydroelectric power generation, fish and wildlife uses, live-stock watering, and recreation. Ground water is used for irrigation, water supply for humans and animals, and commercial and industrial uses. In some cases ground water contributes flow to surface water, as either a deliberate or unintended result of the original use. In several places, ground water is pumped to maintain water levels in lakes and wetlands. Groundwater applied to fields for irrigation may infiltrate into aquifers and be discharged into rivers. Also, some ground water used for public water supply is returned to streams via wastewater treatment plant discharge.

Since 1950, demand for water for domestic, industrial, agricultural, recreational, and fish and wildlife uses has increased dramatically. Competition for available water supplies has produced conflicts over the use of surface and ground water between users within the State, and between adjacent states. Careful management of the State's water resources is required to balance competing needs for available water. To make informed management decisions, accurate and comprehensive water-use data are needed at both the State and National levels. The Natural Resources Commission (NRC), the State's water resources planning agency, is cooperating with the U.S. Geological Survey (USGS) to develop water-use data needed for planning and management.

The purpose of the USGS's National Water-Use Information Program is to establish and maintain a water-use database in each state that is responsive to the needs of water managers at the State and National levels. The system provides for the collection, storage, manipulation, and dissemination of water-use data from government agencies, industrial and commercial establishments, public utility systems, agricultural and irrigation entities, and domestic developments. The system includes data on water withdrawals and returns by aquifer, county, and hydrologic unit. Estimates are used where water-use measurements are not available.

The USGS has published reports on estimated use of water in the United States at 5-year intervals since 1950, and has cooperated in the publication of reports on water use in Nebraska since 1965. The NRC has cooperated with the USGS to collect and compile this information for 1990 and 1995.

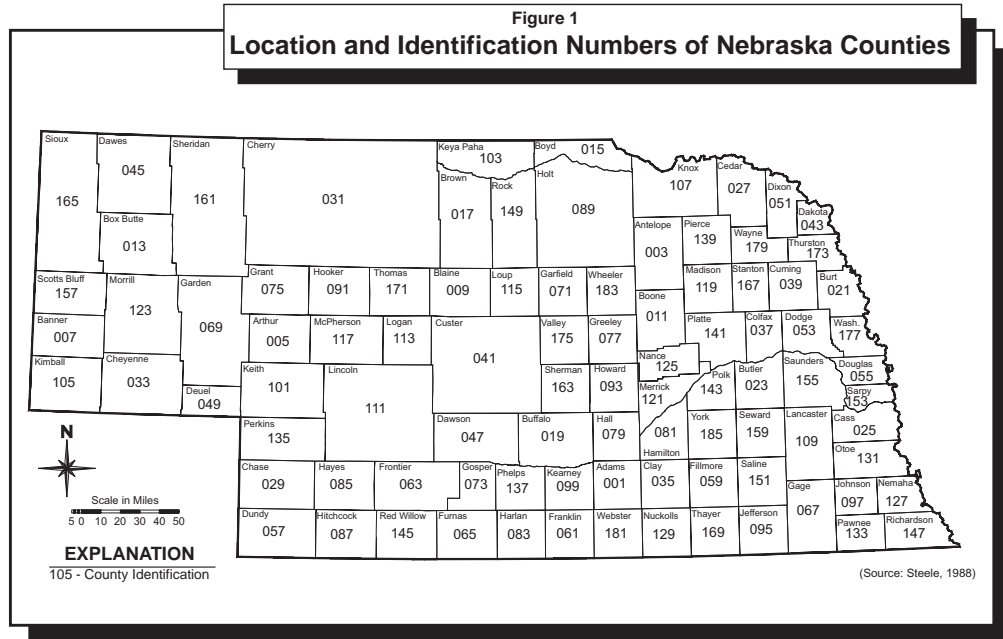
SCOPE OF THE REPORT

This report presents estimates of water use in Nebraska for 1995 as compiled for the USGS National Water-Use Information Program. Estimates for 13 categories of use are given for Nebraska counties, and water-resources subregions and cataloging units in tables at the end of the report. These units are identified by unique hydrologic unit codes (HUC) that are 4 and 8 digits long, respectively. Although the term HUC can be used to refer to any of the 2- and 8-digit hydrologic units, to remain consistent with the terminology used in the 1985 and 1990 reports, the term is used in the text to mean the 8-digit hydrologic cataloging unit specifically. Associated data such as power generated and the number of acres irrigated, also are given. Data on use of water by aquifer are available from the USGS.

County locations and identification numbers are shown in figure 1; hydrologic unit and subregion boundaries are shown in figure 2; and Nebraska river basins, which are generally the equivalent of the subregions, are shown in figure 3.

Site-specific data from individual industries and public water suppliers have been aggregated with less-detailed estimates to produce water-use estimates at the county or HUC level. Variability in the data and methods of estimation produced less accurate estimates of some types of uses, but results are presented as reported in the U.S. Geological Survey's Aggregate Water-Use Data System.

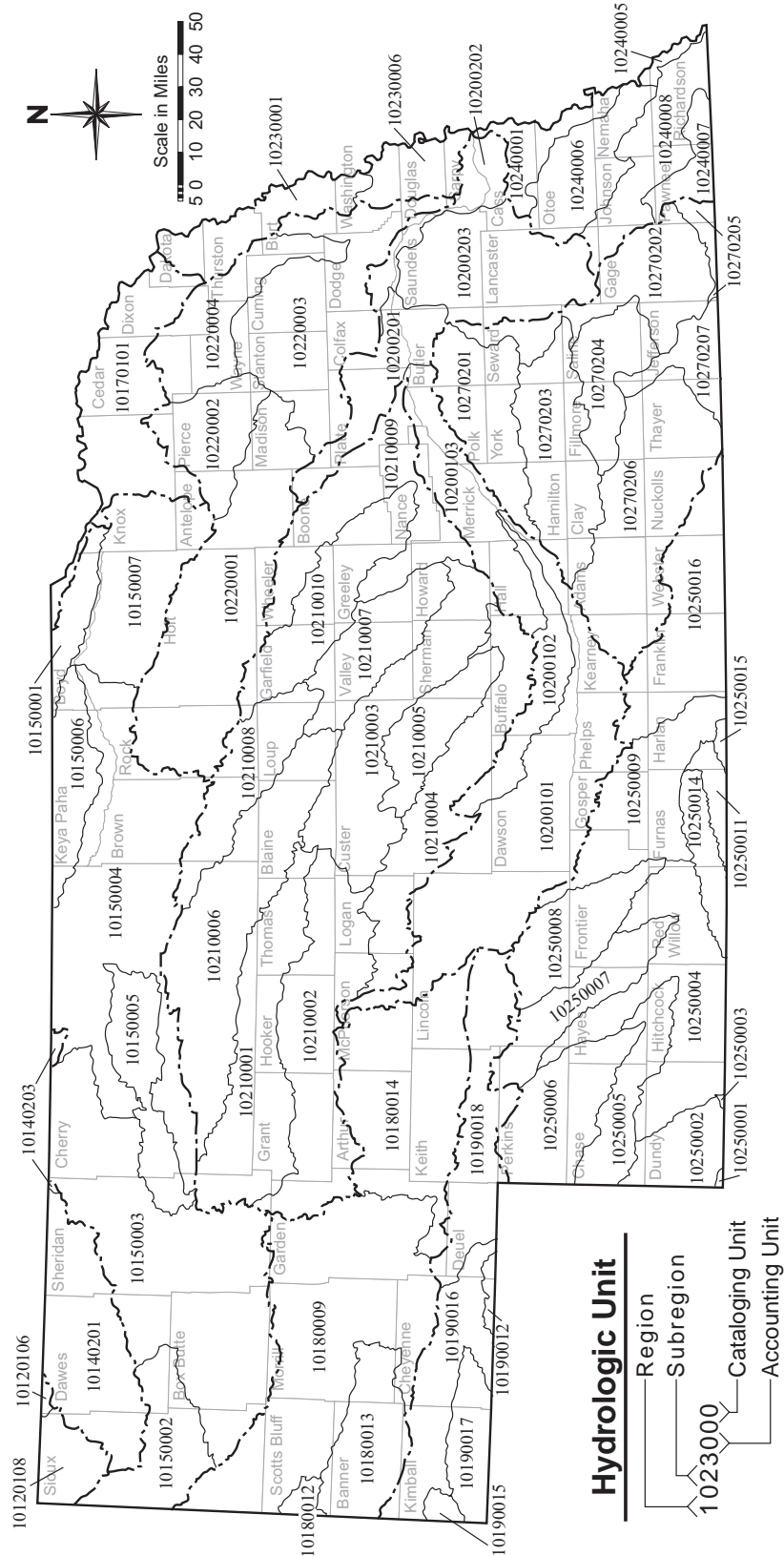
Figure 1
Location and Identification Numbers of Nebraska Counties



ACKNOWLEDGEMENT

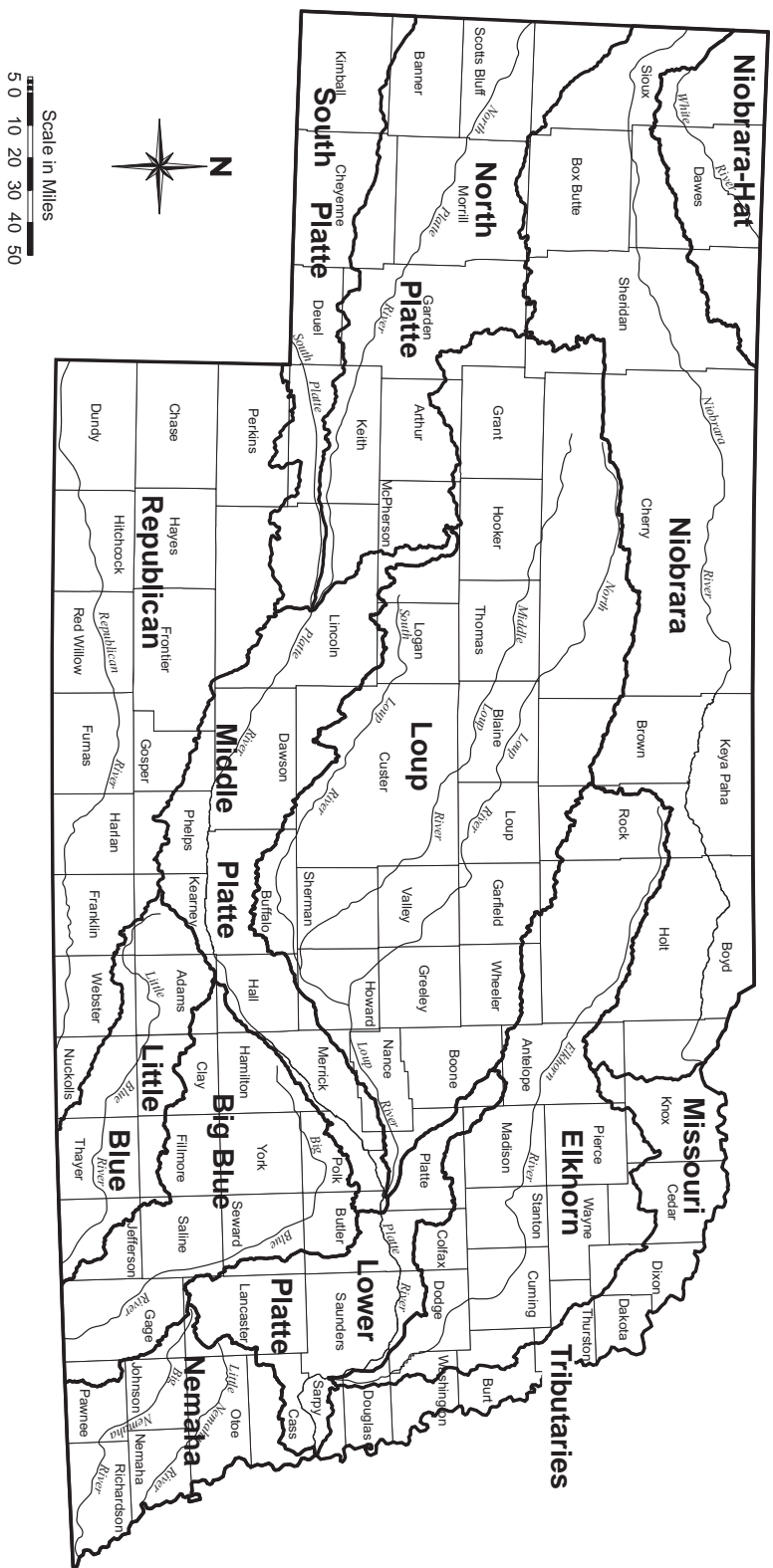
The NRC acknowledges the assistance given by personnel from the following Federal and State agencies, Nebraska power and irrigation districts, municipalities, and other public water suppliers: U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Department of Agriculture-Rural Development, Nebraska Agricultural Statistics Service, Nebraska Departments of Economic Development (DED),

Figure 2
Hydrologic Units and Subregions of Nebraska



Conservation and Survey Division
Institute of Agriculture and Natural Resources
The University of Nebraska - Lincoln

Figure 3
Nebraska River Basins



Scale in Miles
0 10 20 30 40 50

Environmental Quality (DEQ), and Water Resources (DWR), Nebraska Oil and Gas Conservation Commission, Nebraska Game and Parks Commission, University of Nebraska-Lincoln Conservation and Survey Division, Central Nebraska Public Power and Irrigation District, Nebraska Public Power District, Omaha Public Power District, Metropolitan Utilities District (MUD), and the City of Lincoln Water System.

We especially wish to express our gratitude to the personnel of the Nebraska Health and Human Services System (HHS), Department of Regulation and Licensure (formerly the Nebraska Department of Health) for their assistance and advice on public water supplies.

NEBRASKA RESOURCES

Nebraska covers an area of 77,227 square miles. There are 93 counties and all or part of 68 HUCs in the state. The population, climate, and land use vary greatly between counties and HUCs.

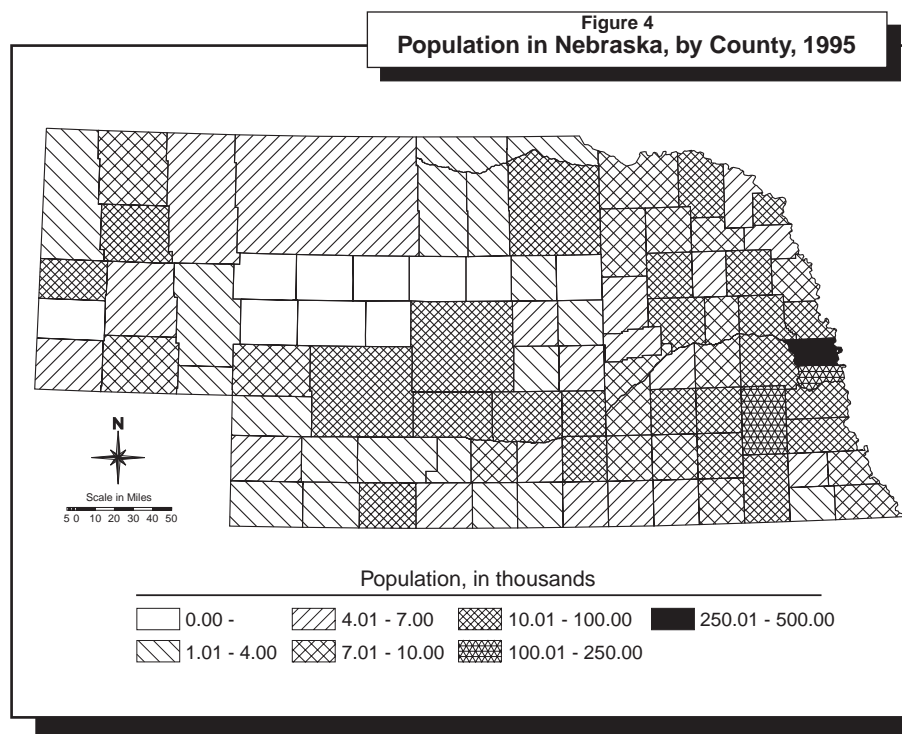
Population

The Nebraska population in the 1990 census was 1,578,385 [16]. The State population in 1995, estimated by the Bureau of the Census, was 1,637,112 (U.S. Department of Commerce, Bureau of the Census, 1995, Federal State Cooperative Program for Population Estimates, @ <http://www.census.gov/population/www/coop/fscpe.html>). Population ranges in Nebraska, for 1995 are shown by county in figure 4 and subregion in figure 5.

The 1990 census indicated that most people lived in urban areas with populations over 2,500, but the majority of the cities and villages

had populations under 1,000. The population living in urban areas was 1,043,984, which was 66 percent of the State population. Three Metropolitan Statistical Areas (MSAs) located in eastern Nebraska had a combined population of 766,017, which

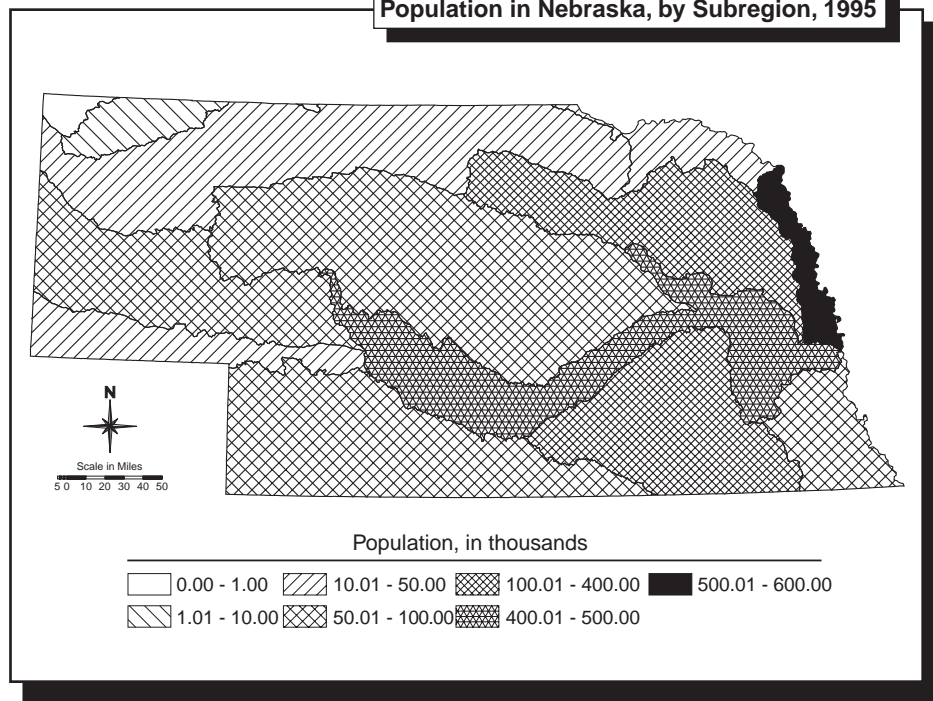
66% of the state population lives in urban areas, with 48.5% of those in three metropolitan areas in eastern Nebraska.



was 48.5 percent of the state's population [16].

In 1995 there were 535 incorporated cities and villages in Nebraska [12]. Of the 535 municipalities, 420 or 78% had a population less than 1,000, and 84 had less than 100 people.

Figure 5
Population in Nebraska, by Subregion, 1995



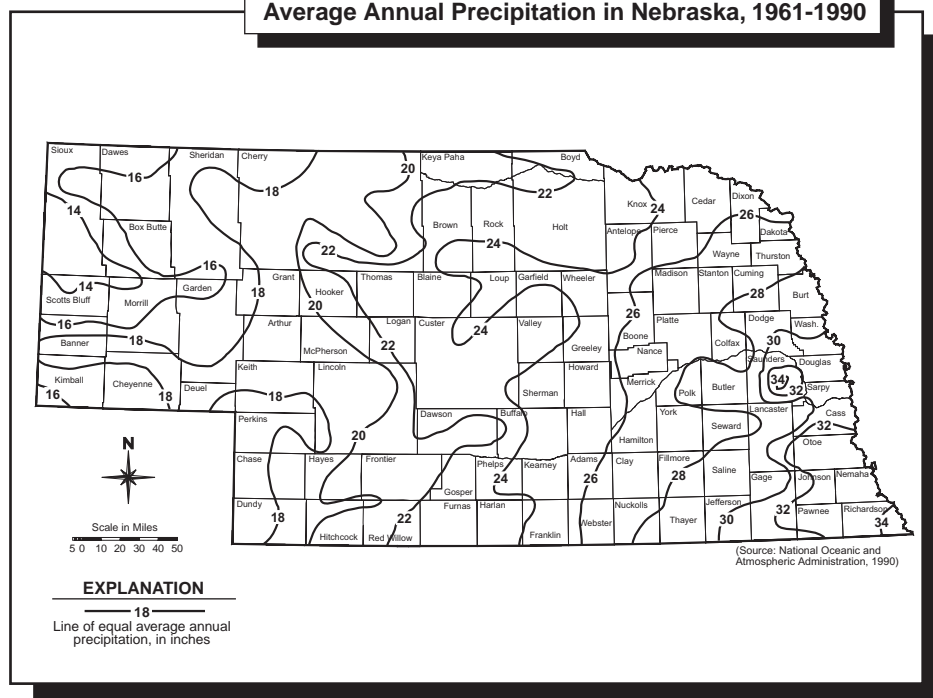
Climate

The climate varies across Nebraska from east to west, and departures from average climatic values vary significantly from year to year. The length of the growing season and precipitation patterns, and the departure from average significantly influence the choice of crops grown and the amount of water used for irrigation and other purposes. The growing season decreases from approximately 170 days in the southeast to 120 days in the extreme northwest.

Average annual precipitation (1961-90), which ranges from about 34 inches in the southeast to about 14 inches in the western Panhandle, is shown in figure 6.

Weather is also highly variable during the year. For example, nearly two-thirds of the annual precipitation usually occurs

Figure 6
Average Annual Precipitation in Nebraska, 1961-1990

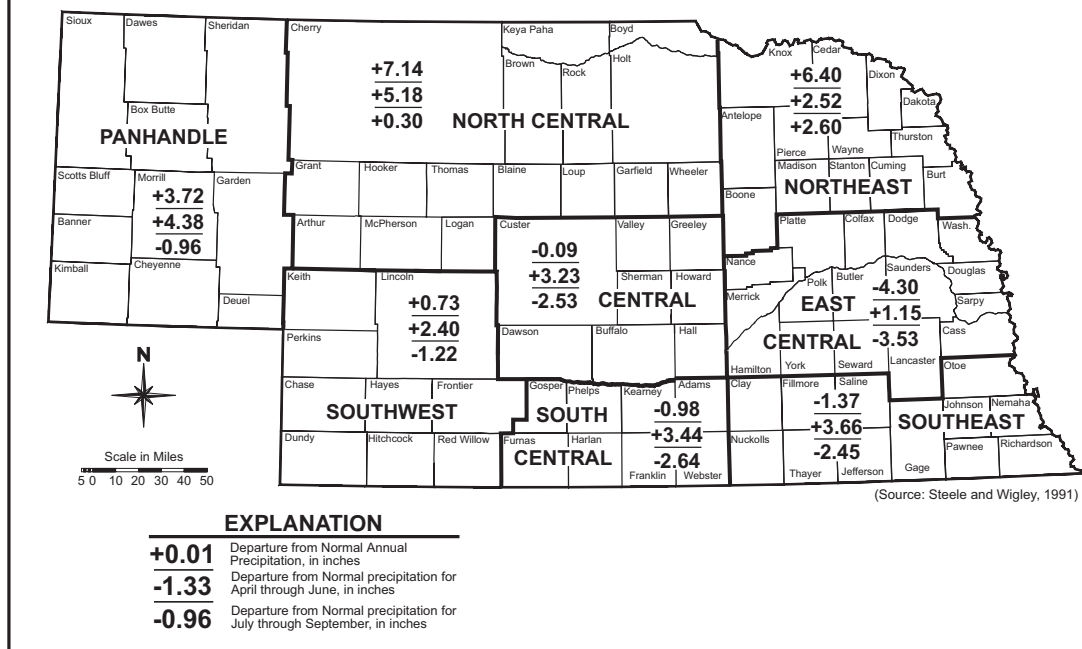


during the growing season (from April through September), with thunderstorms providing significant amounts of precipitation. Such storms vary greatly in intensity, total rainfall, and areal coverage,



creating significant disparities between regions. Based on the climate differences in the state, the National Oceanic and Atmospheric Administration divides Nebraska into eight divisions [7]. The departure from normal precipitation for the 1995 growing season and calendar year in the eight climatic divisions is shown in figure 7. Above average precipitation for April through June 1995 for all eight divisions, and below average precipitation in six of the eight divisions from July through September affected irrigation, domestic, and other water uses [8].

Figure 7
Departure from Normal Precipitation (1961-90) in Nebraska,
by National Oceanic and Atmospheric Administration
Climatic Divisions, 1995



WATER AND LAND RESOURCES

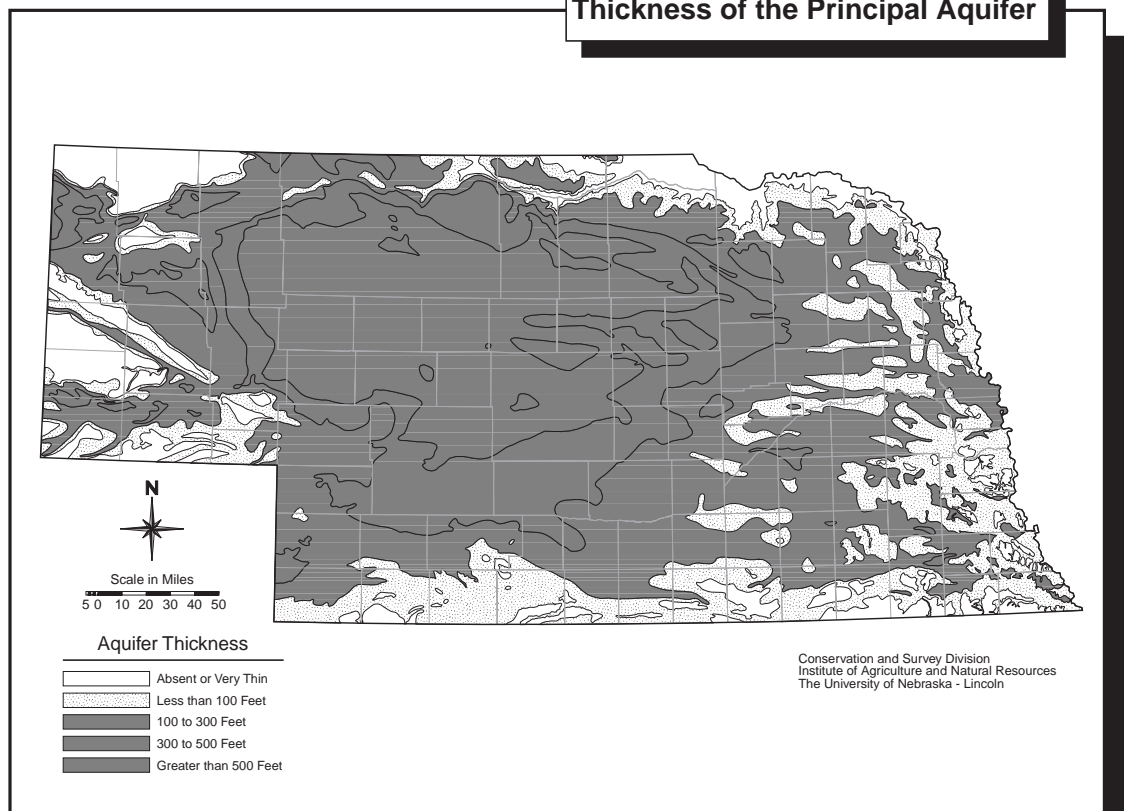
Major surface-water sources include the Niobrara, Platte, Loup, Elkhorn, Missouri, Nemaha, Republican, Big Blue, and Little Blue Rivers (figure 3). Ground-water supplies are mostly derived from the High Plains aquifer, which underlies most of the State and is comprised principally of the Ogallala Formation and aquifers of Quaternary age. The thickness of the principal aquifer is shown in figure 8.

According to the 1992 Census of Agriculture [17], the amount of land in farms was 44,393,129 acres, which was 89.8 percent of the total area in Nebraska. About half (22,402,132 acres) of the land in farms was cropland. About 6,039,000 acres of cropland and pasture were irrigated in 1982. This number declined to 5,682,000 acres irrigated in 1987, then rose again to 6,312,000 in 1992. It was estimated that the growth in the amount of irrigated cropland and pasture continued into 1995, when irrigated land had further increased to more than 7,448,700 acres (National Agricultural Statistics Service, Internet homepage @ <http://usda.mannlib.cornell.edu/cgi-usda/agency.cgi?nass> and Nebraska Agricultural Census Internet homepage @ <http://govinfo.kerr.orst.edu/cgi-bin/ag-state?Nebraska>).

The amount of land in farms, 44,393,129 acres, was 89.8 percent of the total area in Nebraska.



Figure 8
Thickness of the Principal Aquifer



Chapter Two

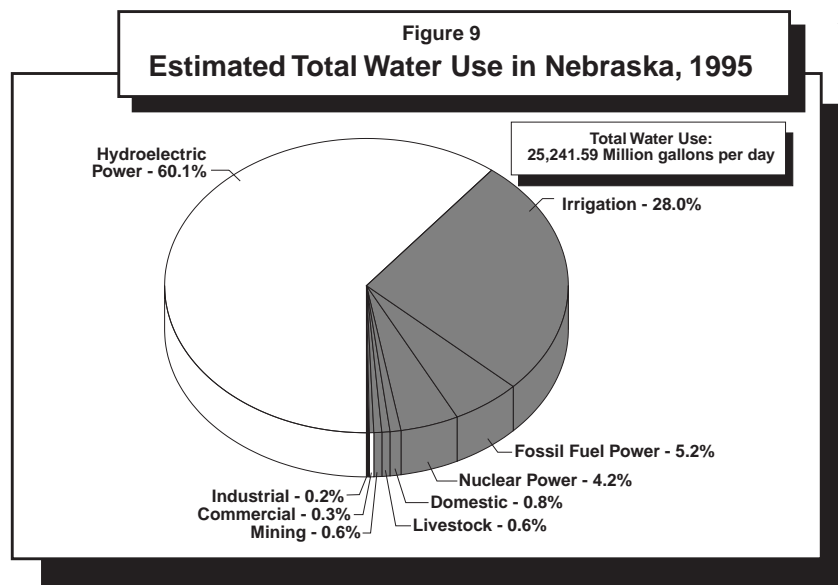


ESTIMATED WATER USE IN NEBRASKA, 1995

The estimated volume of water used in Nebraska during 1995 was 28,295,800 acre-feet, a rate of 25,241.59 million gallons per day (Mgal/d), if averaged over the entire year. The per capita use rate was 15,418.30 gallons per day for the population of 1,637,112. The largest use of water in 1995, 17,354.26 Mgal/d (Table 20 and abstract), was for power generation. Of the total water used, 180.93 Mgal/d were released to streams by public wastewater treatment facilities.

Total water use for 1995 given in this report includes 245.45 Mgal/d lost by evaporation from large reservoirs. Reservoir evaporation was not reported as part of total water use in 1985 and 1990. Estimated water use by category during 1995, as shown in figure 9, excludes reservoir evaporation, so it may be compared with previous reports.

Total surface water use of 19,040.61 Mgal/d was 75.4 percent of total water use in the State. Estimated use of surface water, excluding reservoir evaporation, of 18,795.16 Mgal/d accounted for 74.5 percent of the total water use.



Hydroelectric power generation alone used 15,001.23 Mgal/d, 79.8 percent of non-evaporation use. Electric power generation of all types used 17,349.83 Mgal/d, 92.3 percent. Irrigation was the second largest use of

surface water, withdrawing 1,219.78 Mgal/d, only about 6.5 percent. No saline surface water was used in Nebraska in 1995. Estimated surface-water use by category is shown without reservoir evapora-

tion losses in figure 10, so it can be compared with 1985 and 1990 graphs.

Estimated ground-water use of 6,200.98 Mgal/d accounted for the remaining 24.6 percent of total water use in Nebraska during 1995. Only 4.70 Mgal/d of the ground water used was saline water. Estimated irrigation use of 5,776.60 Mgal/d was 93.1 percent of the total ground water used in 1995. The second largest

use of ground water, public water supplies, was 232.25 Mgal/d, which was less than 4 percent of total ground water use. In contrast with surface-water, ground-water use for fossil fuel power generation was only 4.4 Mgal/d, less than 0.1 percent of all ground-water use. Estimated ground-water use by category is shown in figure 11.

Excluding use of surface water for power production and reservoir evaporation, which are largely non-consumptive, estimated total water use in Nebraska in 1995 was 7,646.31 Mgal/d, or 8,571,500 acre-feet. Ground water accounted for 81.1 percent of this total, and surface water accounted for 18.9 percent.

PUBLIC WATER SUPPLY

The Nebraska HHS uses the same definition for public water supply (PWS) systems as the Federal Safe Drinking Water Act. In 1995, Nebraska's public water supply systems included: municipalities, manufactured home courts, sanitary improvement districts, rural water districts, subdivisions, Indian reservation systems, and the Metropolitan Utilities District. Withdrawals and deliveries were estimated for a total of 556 PWSs for which adequate data were available in 1995. This was only a portion of the total number of public water systems, but the remaining non-community systems were limited in the type and/or extent of service provided. Water withdrawn by PWSs was delivered to customers, used by the system for internal uses, or lost in

Figure 10
Estimated Surface-Water Use in Nebraska, 1995

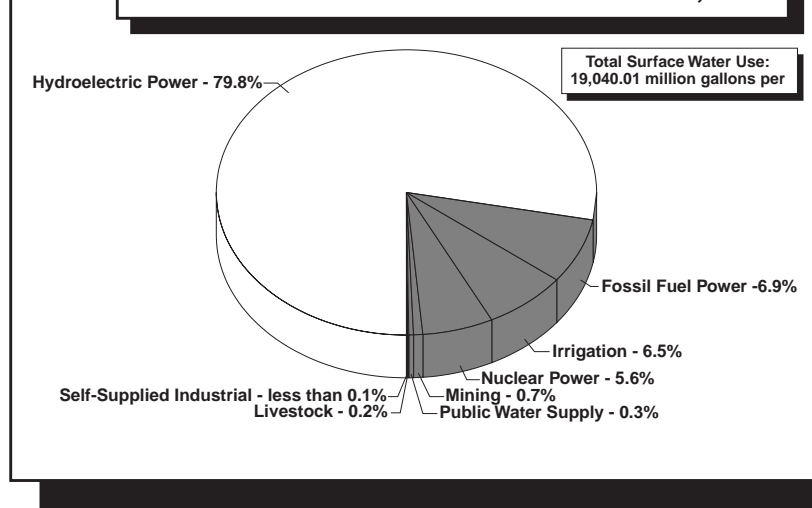
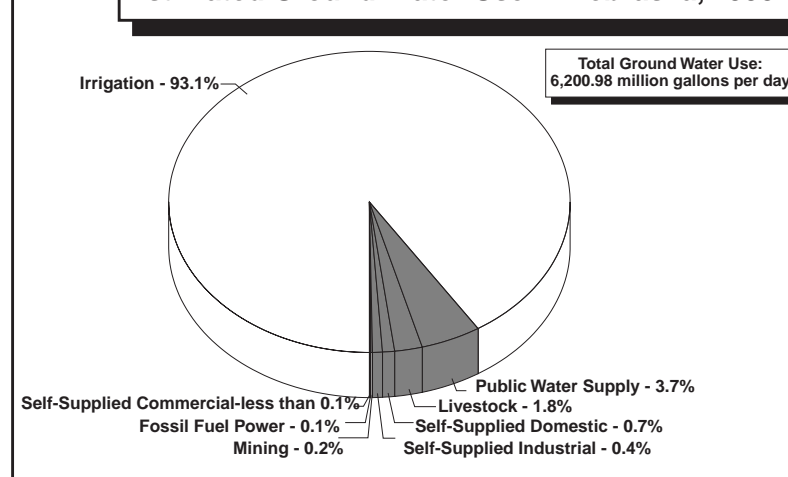


Figure 11
Estimated Ground-Water Use in Nebraska, 1995

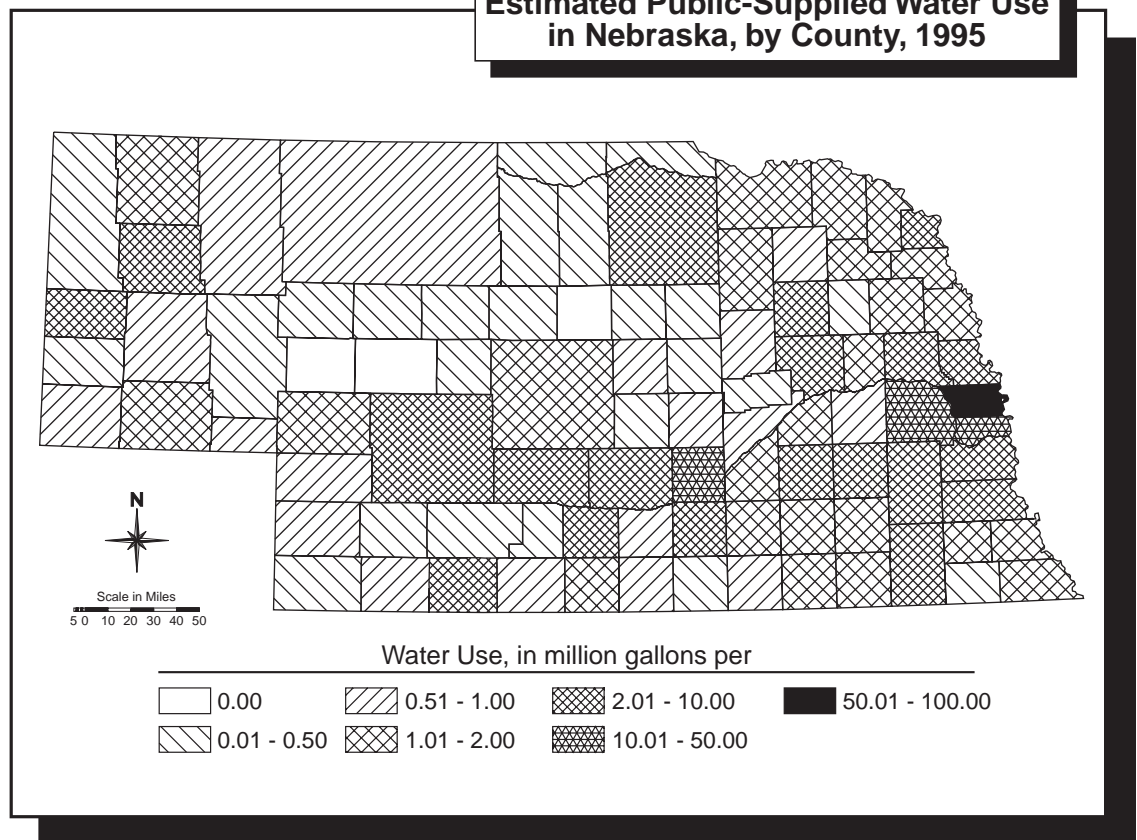


transmission. Deliveries of water for domestic, industrial, commercial, and public water uses, and thermoelectric power generation were provided by these systems. Some delivered water to other PWSs as well as individual users. Many systems, or their supply and transmission lines, cross county and HUC boundaries, so withdrawal and delivery data do not always balance within units. For example, Lincoln's main well field is located outside Lancaster County, so deliveries in Lancaster County greatly exceed withdrawals.



Estimated water withdrawals by PWSs, 285.73 Mgal/d, were 1.1 percent of total water use during 1995. Ground water provided 81.3 percent (232.25 Mgal/d), and surface water provided the remaining 18.7 percent of public-supplied water withdrawals (53.48 Mgal/d). Of water withdrawn by public-supply systems, 54.4 percent was delivered to domestic users. The remaining 45.6 percent (130.32 Mgal/d) was used for industrial, commercial, thermoelectric, and other public water uses, or lost in transmission.

Figure 12
Estimated Public-Supplied Water Use
in Nebraska, by County, 1995



Ranges of PWS withdrawals are shown by county in figure 12 and by subregion in figure 13. Withdrawals of surface and ground water

for public-supplied water use are given by county in table 1, and by HUC and subregion in table 2, at the end of this report.

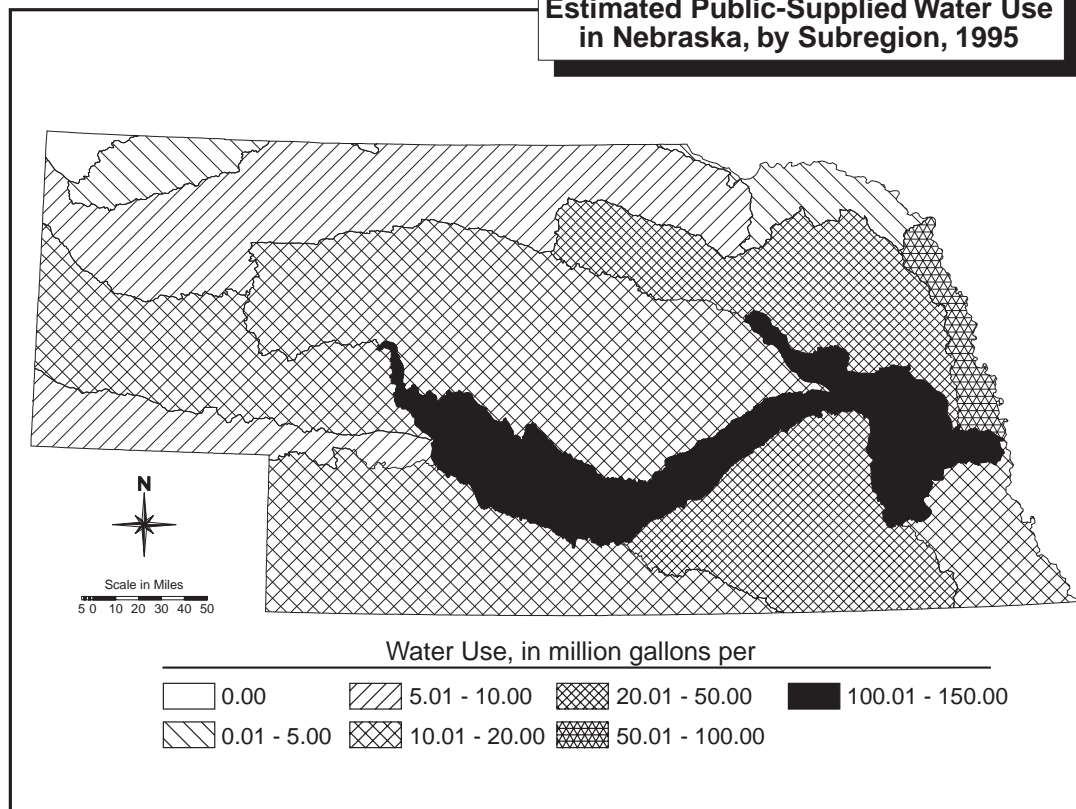
Data were requested from 556 (including Lincoln and MUD) public water suppliers in 1996. Responses were

received from 349, including detailed data supplied by the MUD and City of Lincoln Water System and 296 were used as reported in calculations of county and HUC totals. Data also were used to calculate average per capita withdrawal rates in three different zones across the State delineated by HHS [3].

Estimates of withdrawals by PWSs that did not respond to the survey were based on these averages and the 1995 population served. Responses also were used to calculate statewide average percentages of withdrawals used for total domestic, industrial, and commercial (DIC) delivery and system losses.

Location and sources of withdrawal were identified using data bases maintained by the HHS and DWR and other agencies. Where necessary, locational data were converted to latitude and longitude, and all locational and identification sources were entered into geographical information systems (GIS) software to locate them by county and HUC. If withdrawal data were not identified by source, estimated withdrawal was apportioned equally to the PWSs wells and intakes from other PWSs.

Figure 13
Estimated Public-Supplied Water Use
in Nebraska, by Subregion, 1995



DOMESTIC WATER USE

Domestic use includes watering lawns and gardens, as well as general household uses. Estimated domestic water use in 1995 was 197.25 Mgal/d, a statewide average of 120 gal/d per capita. Estimates of total domestic water use by county and by HUC and subregion during 1995 are given in tables 3 and 4, respectively. County domestic use ranged from 0.07 Mgal/d in Arthur County to 50.74 Mgal/d in Douglas County. Subregion domestic water use ranged from 0.05 Mgal/d in subregion 1012 to 63.31 Mgal/d in 1023. Domestic water supplies were provided by deliveries from public water systems or by self-supplied withdrawals.

Public-Supplied Domestic Water Use

Public-supplied domestic water use in 1995 ranged from none in Arthur, Loup, and McPherson Counties, which had no municipal systems or rural water districts, to 44.41 Mgal/d in Douglas County (table 5). Douglas County was one of three areas in the Omaha MSA. The MUD served most of the population of that area. Domestic use in subregions ranged from slightly less than 0.01 Mgal/d in subregion 1012 in the northwestern corner of the state, to 58.14 Mgal/d in subregion 1023, which includes the most of the Omaha, Nebraska-Iowa MSA (table 6). Public-supplied domestic water use by county is shown

in figure 14 and by subregion in figure 15.

Figure 14
Estimated Public-Supplied Domestic Water Use
in Nebraska, by County, 1995

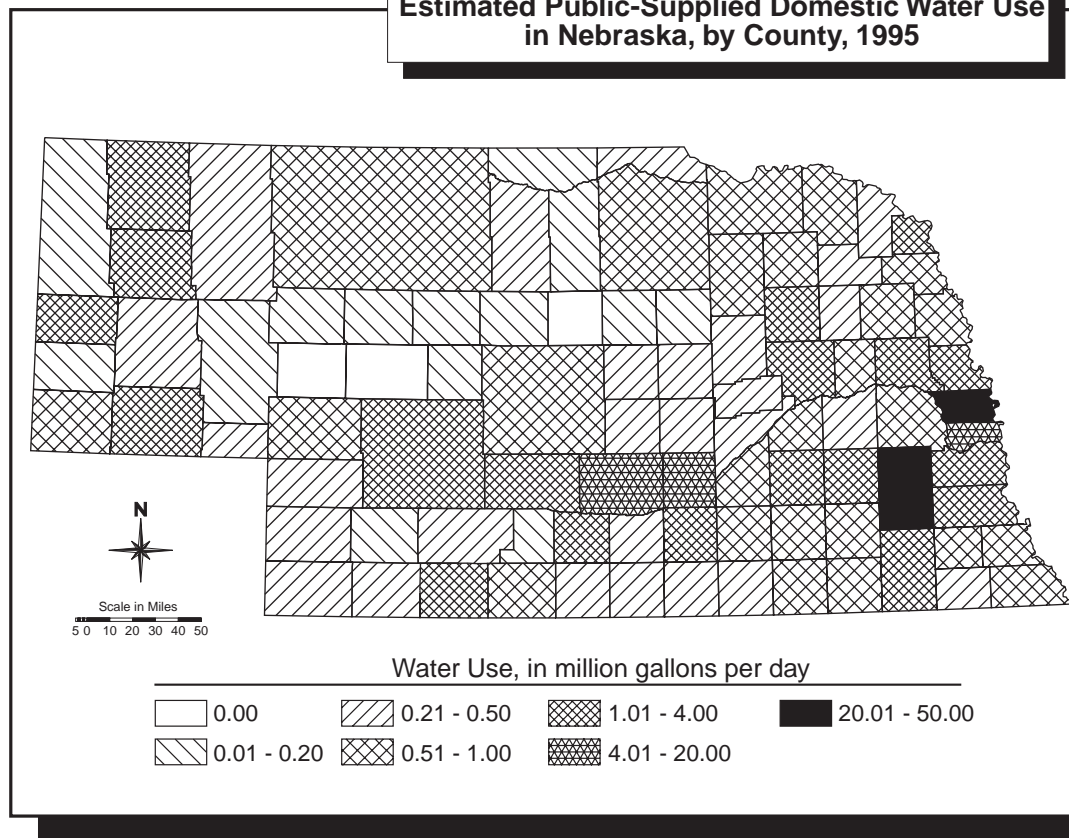


Figure 15
Estimated Public-Supplied Domestic Water Use
in Nebraska, by Subregion, 1995

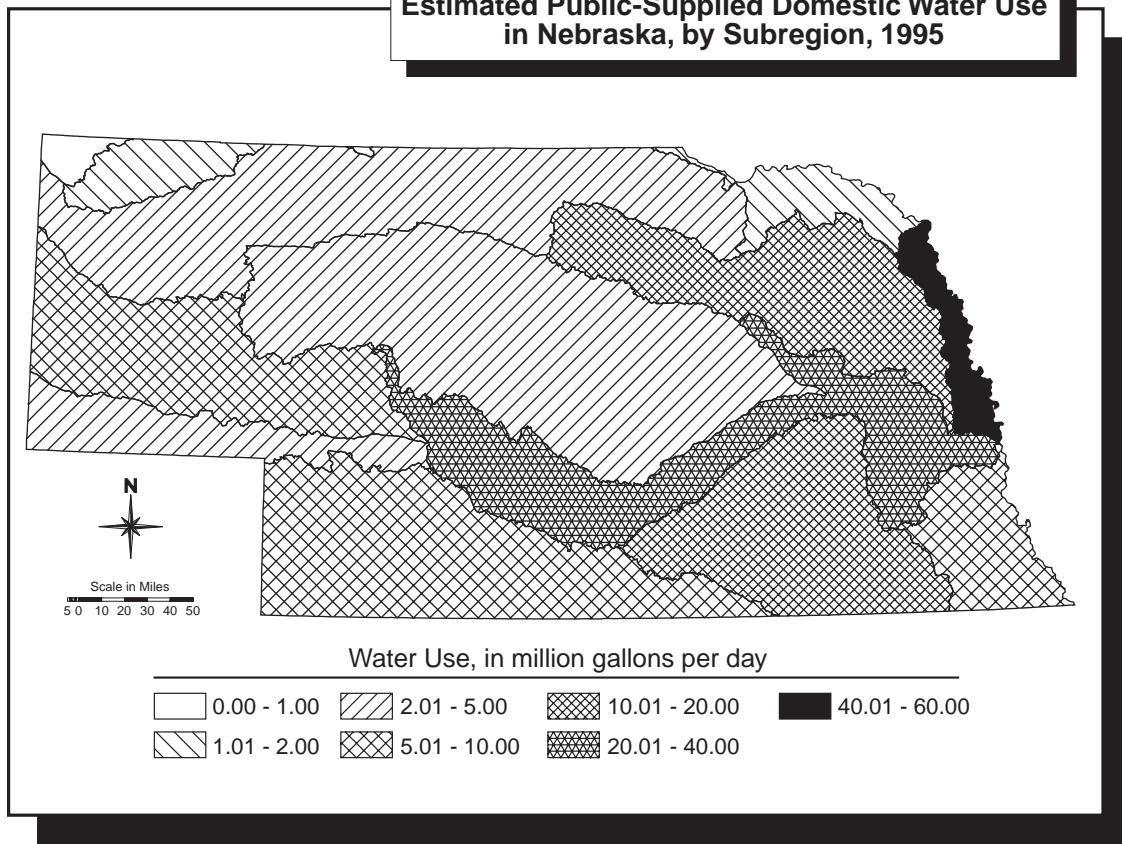


Figure 16
Average Daily per Capita Public-Supplied Domestic Water Use
in Nebraska, by County, 1995

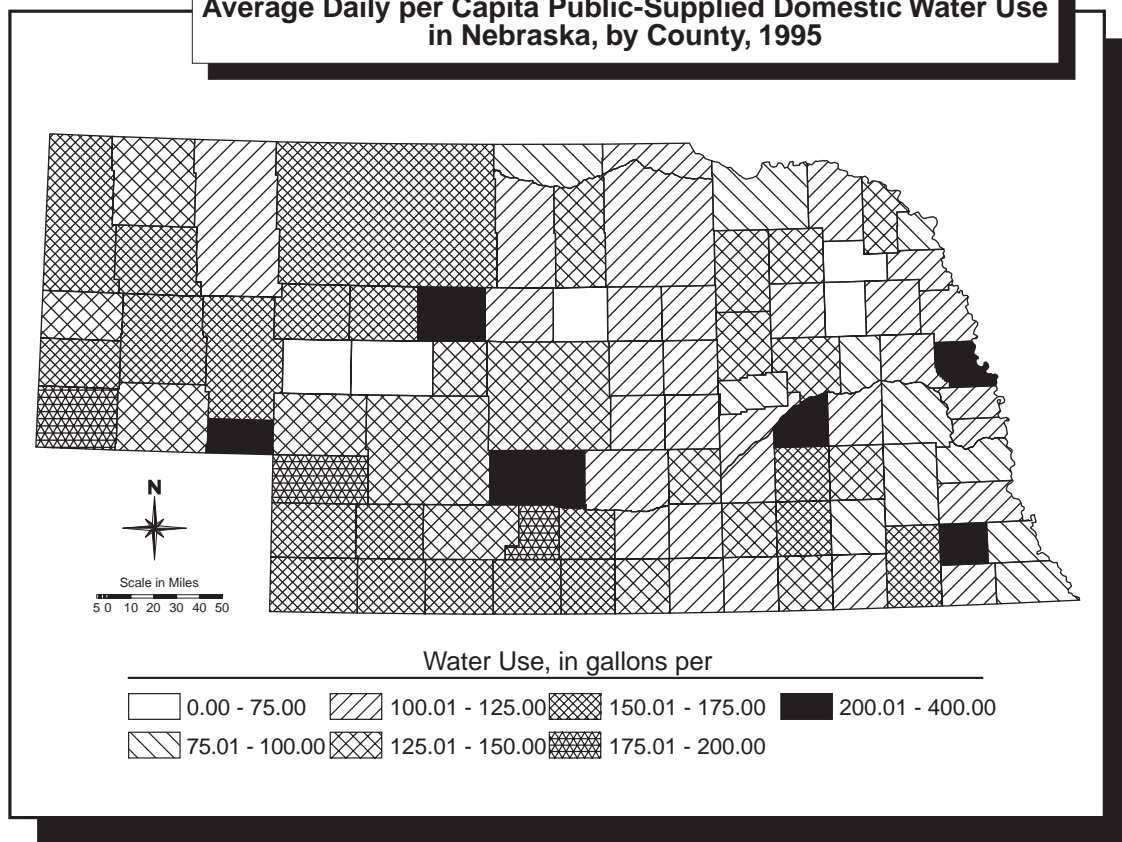


Figure 17
Population Served by Public Water Supply Systems
in Nebraska, by County, 1995

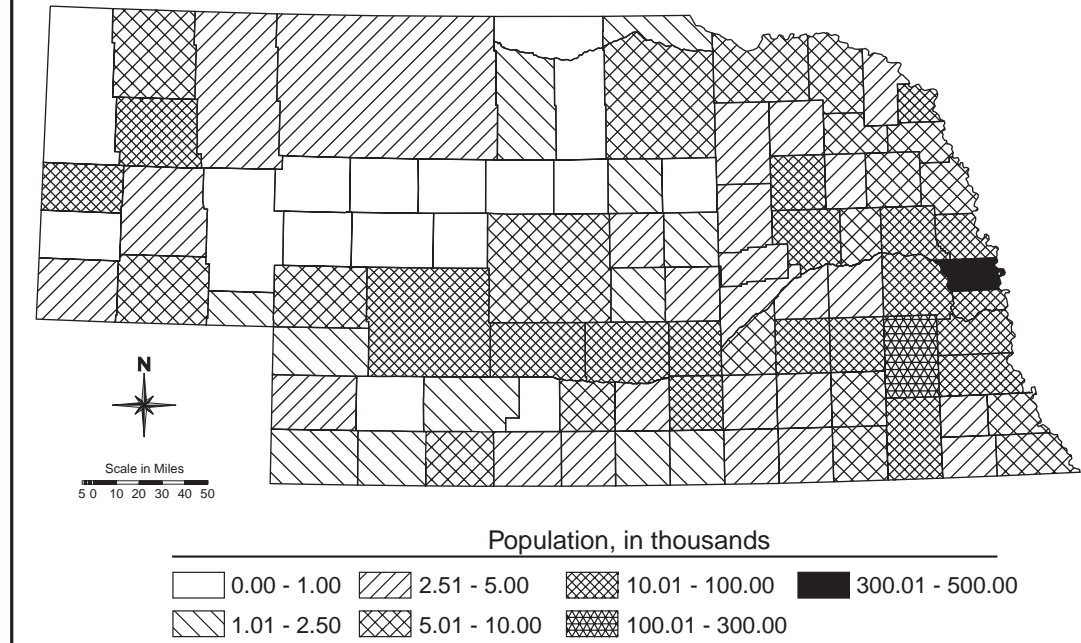
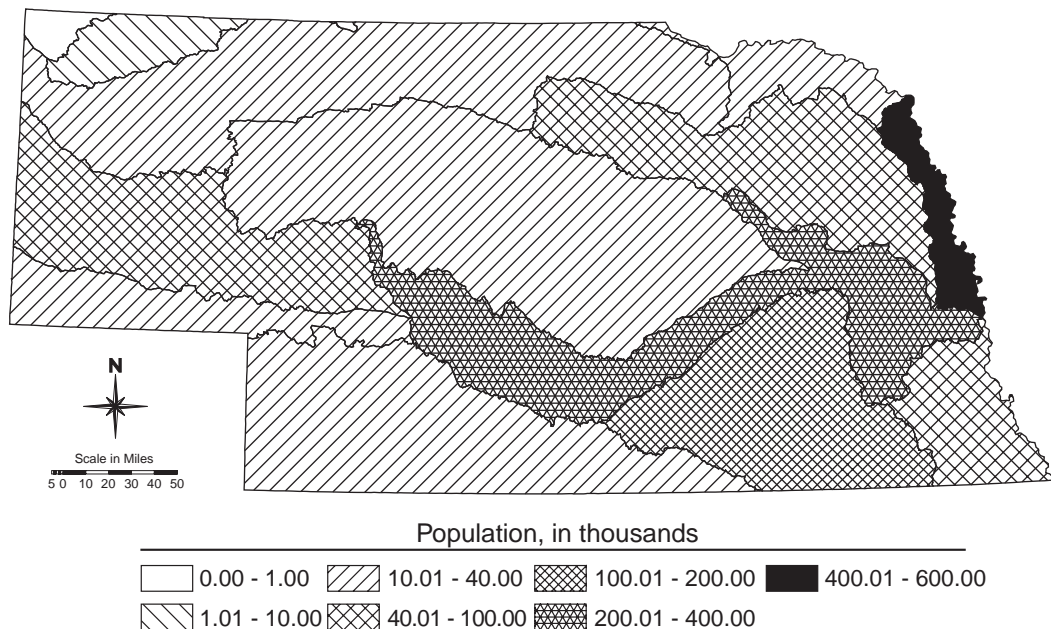


Figure 18
Population Served by Public Water Supply Systems
in Nebraska, by Subregion, 1995



The average public-supplied domestic water use was 120 gal/d per capita in 1995. The average daily per capita public-supplied domestic water use by county is shown in figure 16. A pattern of increasing per capita use from east to west across the State, as annual precipitation decreases, is apparent in figure 16. The range in population served by public water systems is shown by county (fig. 17) and subregion (fig. 18).

Public water supplier survey responses reporting domestic delivery and detailed data supplied by the MUD and City of Lincoln Water System were used as reported in calculations of county and HUC totals. They also were used to calculate average per capita delivery rates in the three HHS zones. Estimates of domestic deliveries by public water suppliers that did not provide delivery data were based on these averages and the 1995 population.

Where municipalities or rural water districts crossed county or HUC boundaries, it was assumed that the population was uniformly distributed and water use was proportioned by area. In the area served by the MUD, HUCs divided only rural areas, not cities, so the rural population for each county was used in proportion to the area of the HUC in the county.

A pattern of increasing per capita use from east to west across the State, as annual precipitation decreases, is apparent.

Self-Supplied Domestic Water Use

Self-supplied domestic water use in Nebraska during 1995 was estimated using the public-supplied domestic water use rates for the three HHS zones and the population in each county not supplied by PWSs. All self-supplied domestic water use was assumed to be ground water.

Self-supplied domestic water use by county ranged from less than 0.01 Mgal/d in Pawnee County to 6.34 Mgal/d in Douglas County (table 7 and fig. 19). Cities and villages serve most of the population of Pawnee County. A rural water district that delivers to several villages as well as rural customers provides water to the remaining residents in the county. Self-supplied domestic use for Nebraska subregions ranged from 0.05 Mgal/d in subregion 1012, in the White River-Hat Creek Basin, to 10.13 Mgal/d in subregion 1020 along the Platte River (table 8 and fig. 20).



Figure 19
Estimated Self-Supplied Domestic Water Use
in Nebraska, by County, 1995

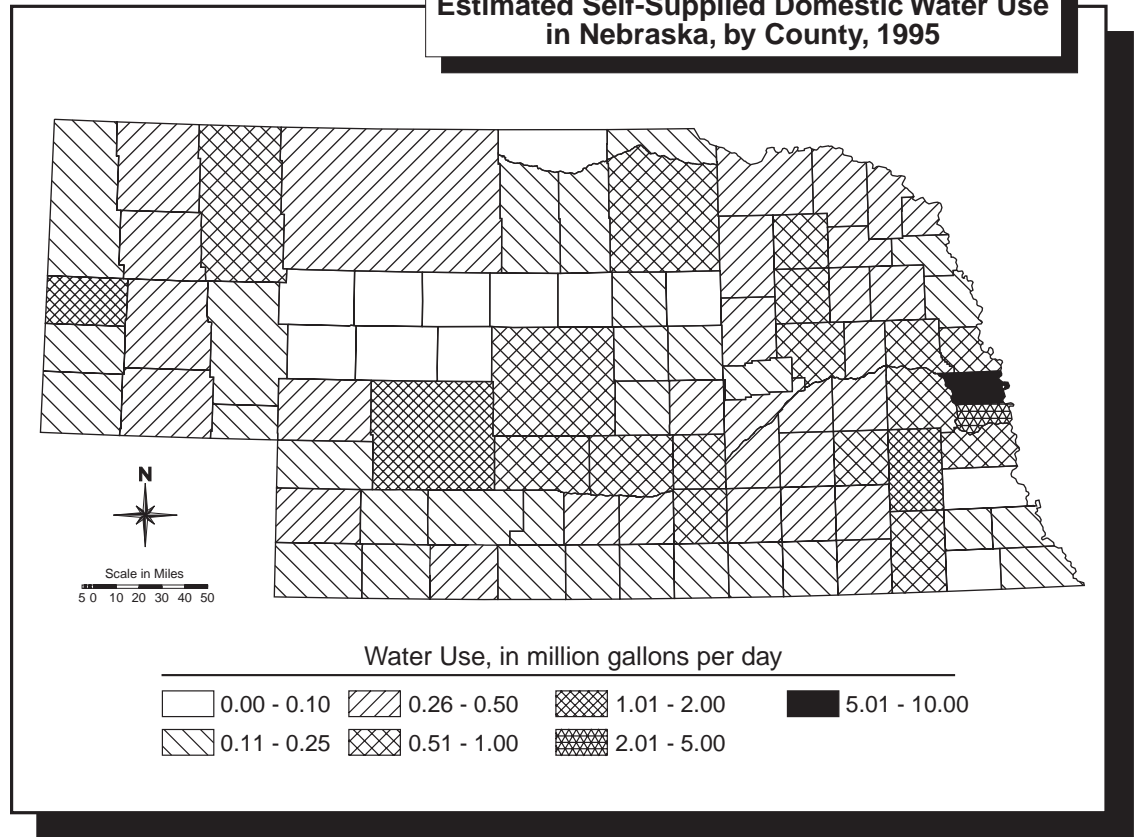


Figure 20
Estimated Self-Supplied Domestic Water Use
in Nebraska, by Subregion, 1995

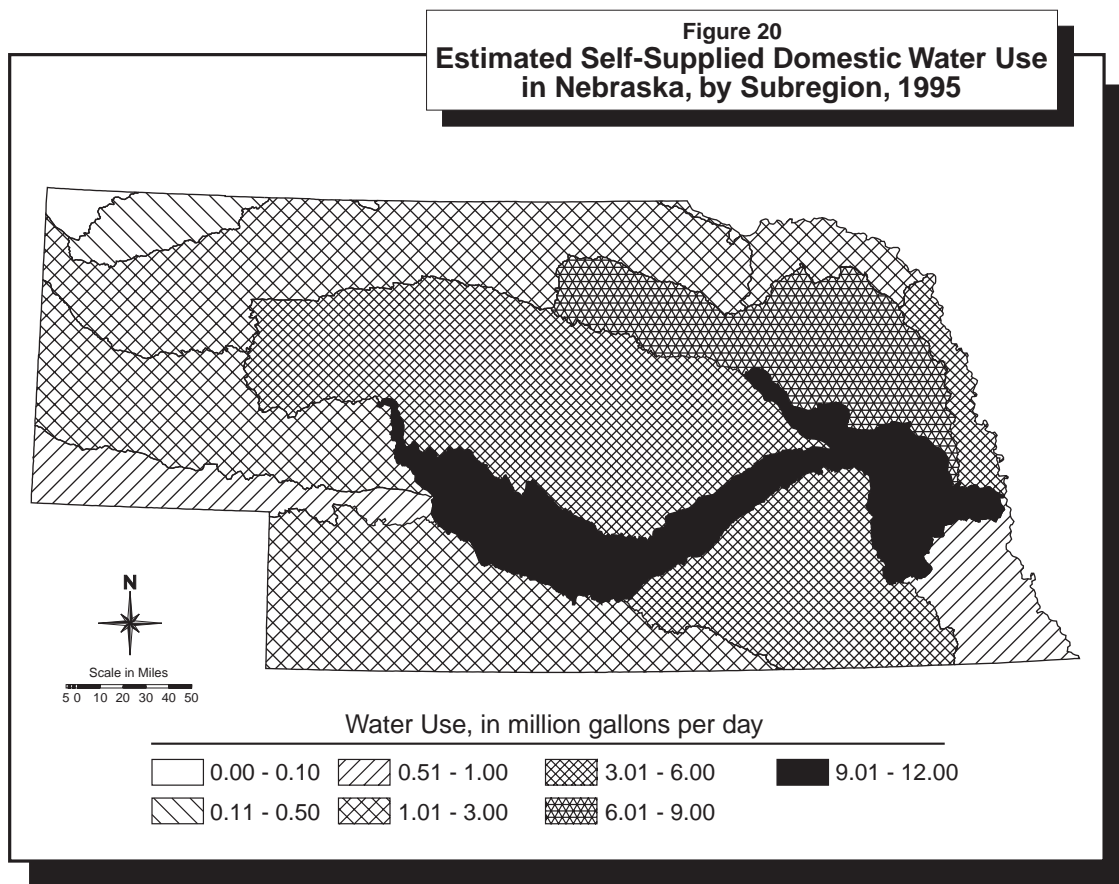


Figure 21
Commercial Water Use
in Nebraska, by County, 1995

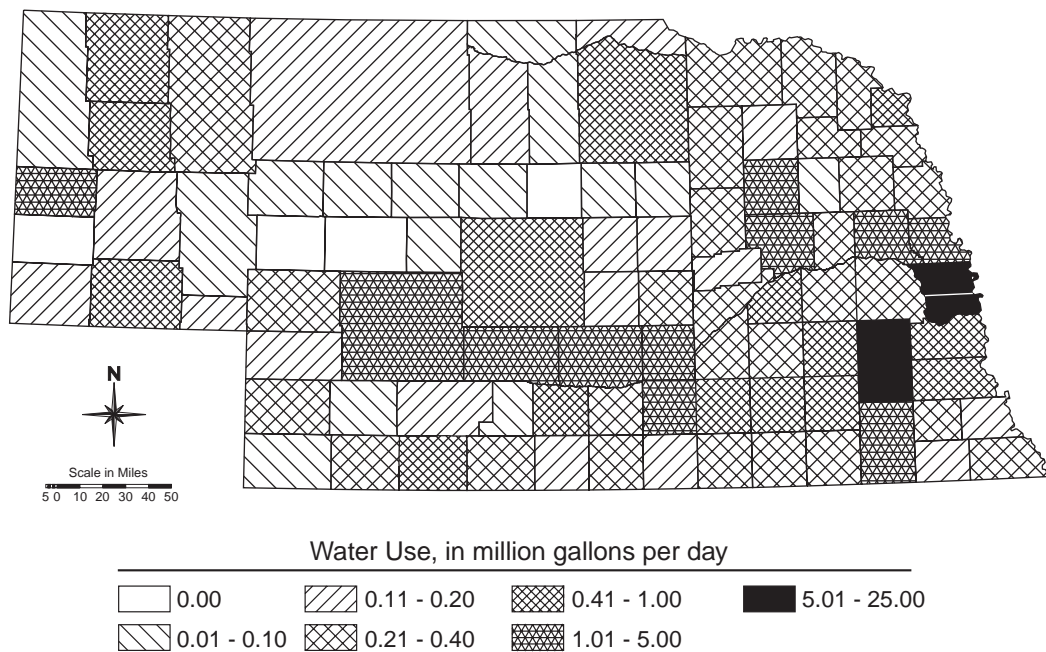
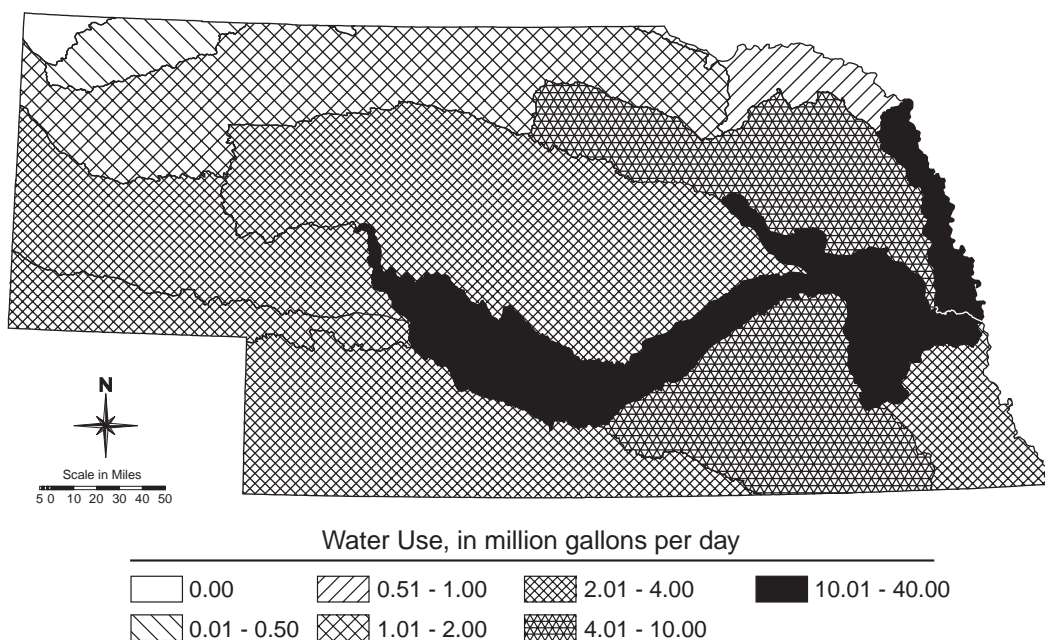


Figure 22
Commercial Water Use
in Nebraska, by Subregion, 1995



COMMERCIAL WATER USE

The commercial water use category includes water withdrawn or delivered for use by facilities such as restaurants, lodging places, office buildings, wholesale and retail businesses, and gov-



ernmental facilities. Water use in Nebraska for this category was estimated to be 78.98 Mgal/d during 1995 (table 9). It was estimated that only 0.39 Mgal/d (0.5 percent) of commercial use was self-supplied, all from ground water. The balance was attributed to deliveries from public supplies. Estimated commercial water use is given by county in table 9 and by HUC and subregion in table 10. The range of commercial water use by county is shown in figure 21 and by subregion in figure 22.

Commercial deliveries were estimated using the reported or estimated withdrawal by the PWS, the statewide average rate of total DIC delivery, the reported or calculated domestic delivery, and the calculated statewide average percentage of commercial delivery. Self-supplied commercial water use was calculated as 0.5 percent of the total commercial use in the county as in 1985 [15]. County commercial use was apportioned to HUCs by the percentage of the area of the county in each HUC.



INDUSTRIAL WATER USE

Estimates of public-supplied industrial water use were based on municipalities' delivery data from the survey of PWSs and MUD. Industrial delivery was calculated from the reported or estimated withdrawal, the statewide average rate of total DIC delivery, the reported or calculated domestic delivery, and the calculated statewide average percentage of industrial delivery. Deliveries were apportioned to HUCs by the percentage of area of the PWS in each HUC.

Industrial water use in Nebraska during 1995 was estimated to be 56.61 Mgal/d. Water used by industries is supplied by PWSs deliveries, as well as self-supplied withdrawals.

Public-supplied deliveries of 26.20 Mgal/d accounted for 46.3 percent of the water used by industries, and self-supplied withdraw-

Figure 23
Estimated Industrial Water Use
in Nebraska, by County, 1995

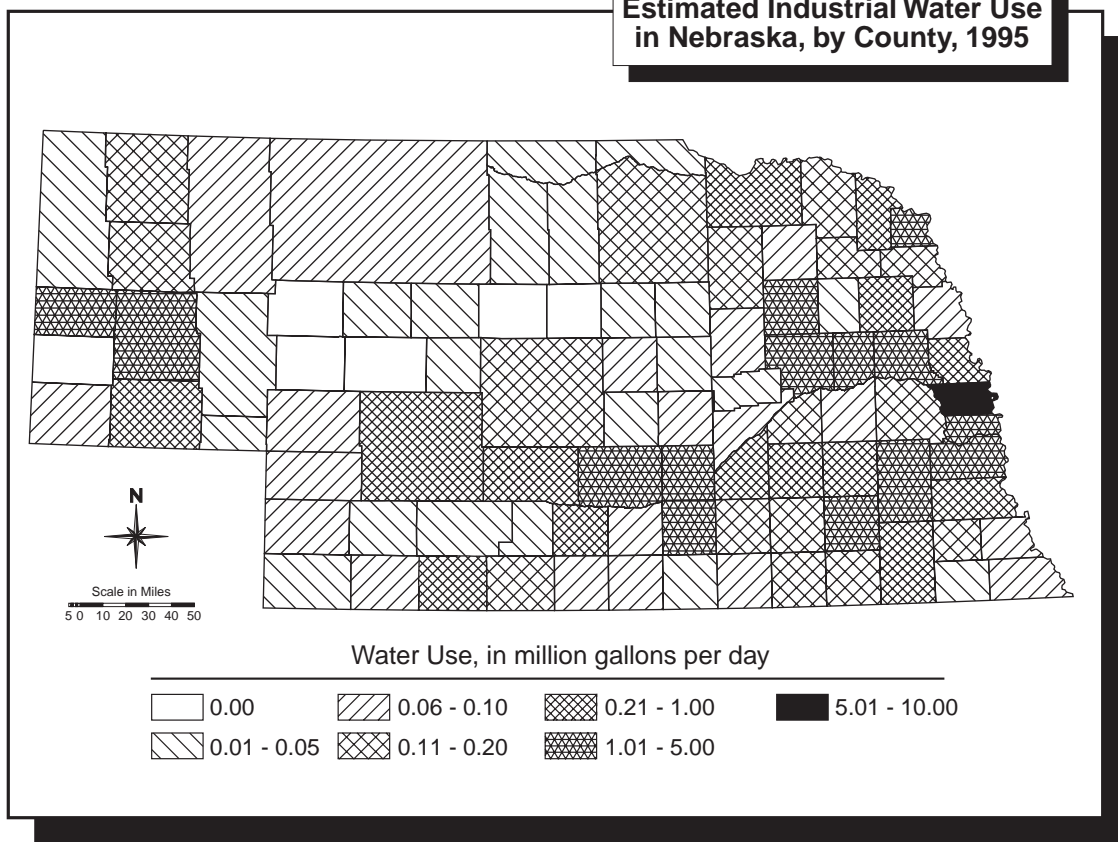
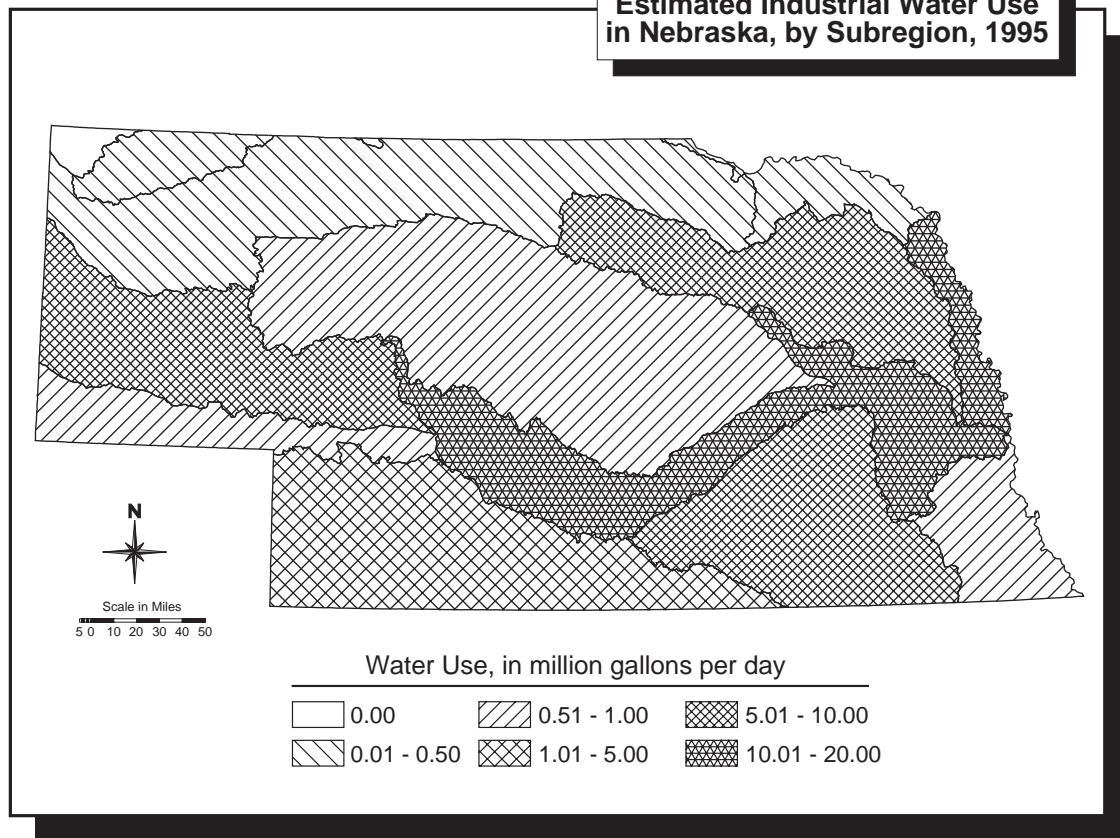


Figure 24
Estimated Industrial Water Use
in Nebraska, by Subregion, 1995



als of 30.41 Mgal/d accounted for 53.7 percent of industrial use (tables 9 and 10). The range of industrial water use is shown by county in figure 23 and by subregion in figure 24.

Industrial facilities were located and categorized by number of employees and Standard Industrial Classification (SIC) codes using the Nebraska Directory of Manufacturers (Nebraska Department of Economic Development, 1996, computer database) and the Manufacturer's News commercial database (Manufacturer's News, Inc., 1995, "Online Directory on Diskette"). Water-use information for some of the largest industries was available from a survey conducted by the Nebraska Natural Resources Commission. Water use for the remaining industries was estimated by using average water-use statistics derived from the NRC survey and several other data sources [3,5,15]. Water use was estimated based on SIC code and number of employees.



The largest users in Nebraska of water for mining were sand and gravel operations.

MINING WATER USE

In Nebraska, water use for mining includes water withdrawn for the extraction of petroleum, well operations for dewatering, normal operations in quarrying, mining clay, sand, and gravel, and other preparations customarily done at the mine site or as part of a mining activity. It does not include the processing of raw materials, such as refining petroleum.

The largest users in Nebraska of water for mining were sand and gravel operations. The estimated water use for mining operations during 1995 was 145.22 Mgal/d. Of that, 134.39 Mgal/d (92.5%) was supplied by surface water for gravel washing and a few limestone quarrying operations. It was estimated that 10.83 Mgal/d (7.5%) was supplied by ground water for injection to deep geologic formations for secondary recovery of oil and solution mining of uranium. Of the water used for secondary recovery, 4.70 Mgal/d was saline ground water. All water withdrawn for mining is self-supplied.

Ranges in water use for mining operations in Nebraska during 1995 is shown, by county, in figure 25 and by subregion in figure 26. Estimates of water use for mining operations by county and by HUC and subregion are given in tables 9 and 10, respectively.

Data from the "Directory of Quarries, Pits, and Mines" were used to identify all active mining operations in the state [1]. It was estimated that 75 percent of the sand and gravel operations used

Figure 25
Estimated Mining Water Use
in Nebraska, by County, 1995

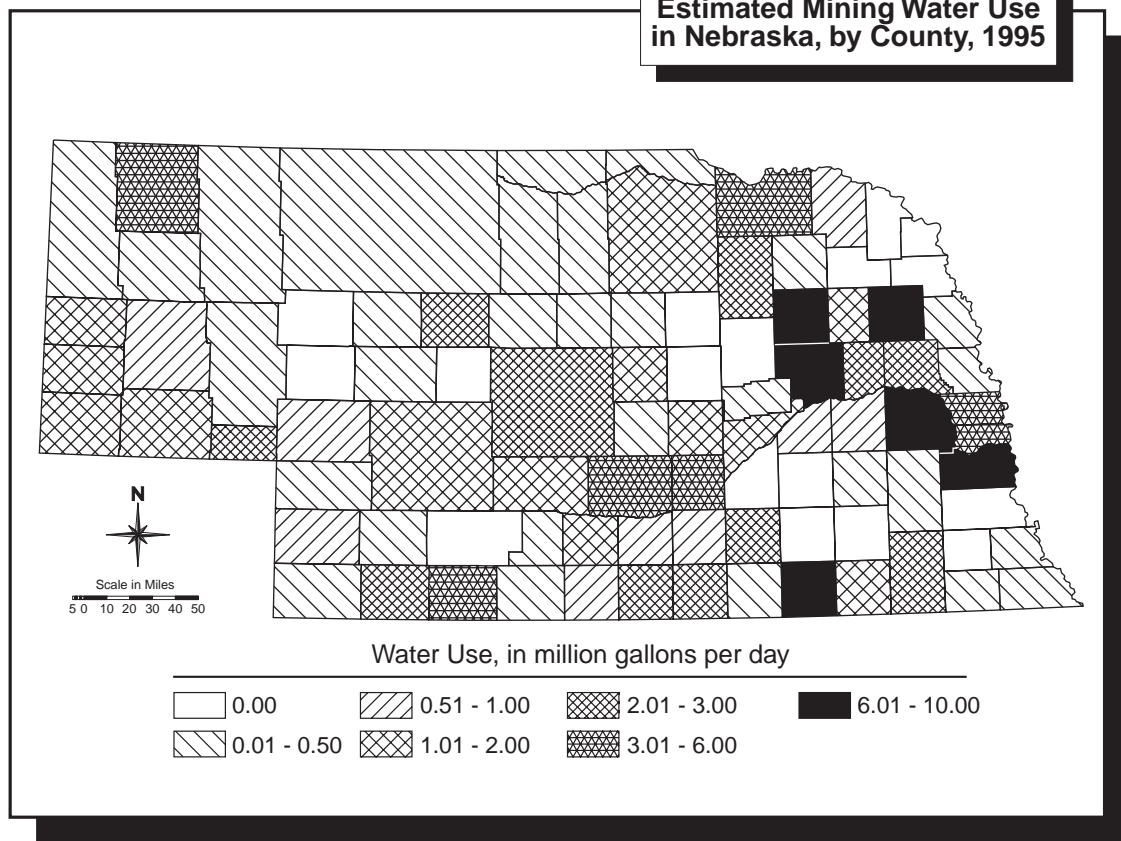
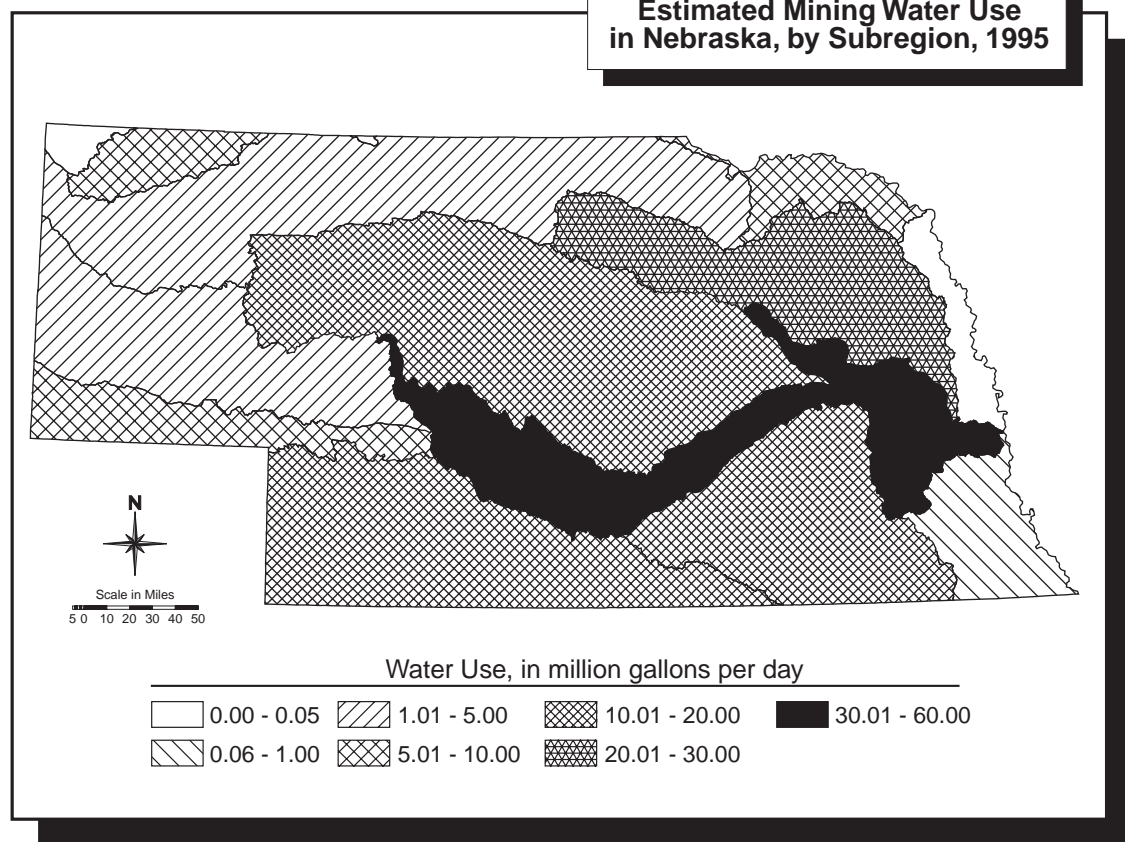


Figure 26
Estimated Mining Water Use
in Nebraska, by Subregion, 1995



surface water and not ground water based on information from the Conservation and Survey Division (Ray Burchett, Conservation and Survey Division, oral commun., 1996). A Geographic Information System (GIS) was used to select 75 percent of all operations closest to streams. Water use was estimated with a regression equation based on production of sand and gravel and withdrawals estimated by owners/operators in telephone surveys in 1991 and 1996. It was assumed there was no consumptive use of water for sand and gravel mining. Water use for quarry and other mining operations also was estimated with a regression equation based on production and estimated withdrawals obtained in 1991 and 1996. Unless site specific information was available for 1995, the proportion of surface and ground water used was estimated with percentages developed by Steele [15]. It was assumed consumptive use for non-sand and gravel operations was 100 percent. Production water used in these operations is for dust control and is consumed.

Oil and gas production data, including project location, amount of oil and water produced, amount of make-up and reinjection water, and the water withdrawal zones were provided by the Nebraska Oil and Gas Conservation Commission (William Sydow, Nebraska Oil and Gas Conservation Commission, written commun., 1996). Water produced and make-up water were defined as ground-water withdrawals. The make-up water, or the difference between the amount of water reinjected and the amount produced, was assumed to be the consumptive use. If the make-up water was fresh water, consumption was 100 percent, because it was reinjected into a saline environment. Saline make-up water was not considered consumed because it was reinjected into saline ground water.



IRRIGATION WATER USE

Irrigation is the controlled application of water to crops to supply moisture requirements not satisfied by precipitation. In Nebraska, the amount of land irrigated and water applied vary each year.

The amount of land irrigated in 1995 was estimated to be 7,448,700 acres, with an average seasonal water application rate of almost 13 in/acre. The number of irrigated acres by county ranged from 1,300 acres in Richardson County to 247,600 acres in Hamilton County (table 11). Every county in Nebraska had irrigated land in 1995. The number of irrigated acres by subregion ranged from 6,300 acres in subregion 1012 in the White River-Hat Creek Basin to 1,612,200 acres in subregion 1020 in the Middle and Lower Platte River Basin (table 12). Irrigated acres are shown by county in figure 27 and by subregion in figure 28.

Figure 27
Estimated Irrigated Acres
in Nebraska, by County, 1995

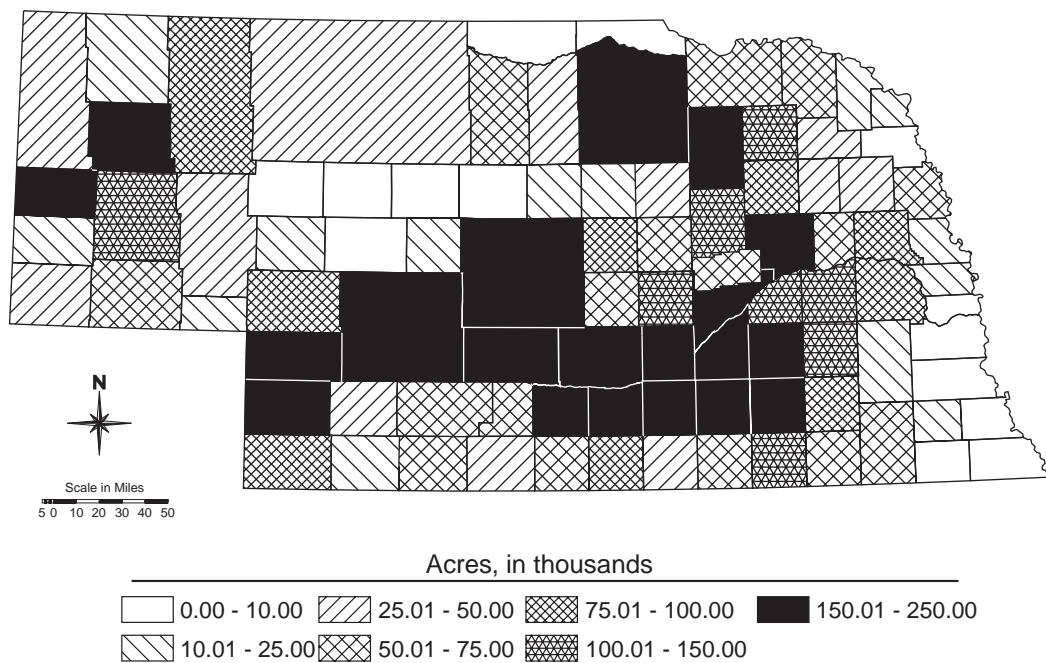
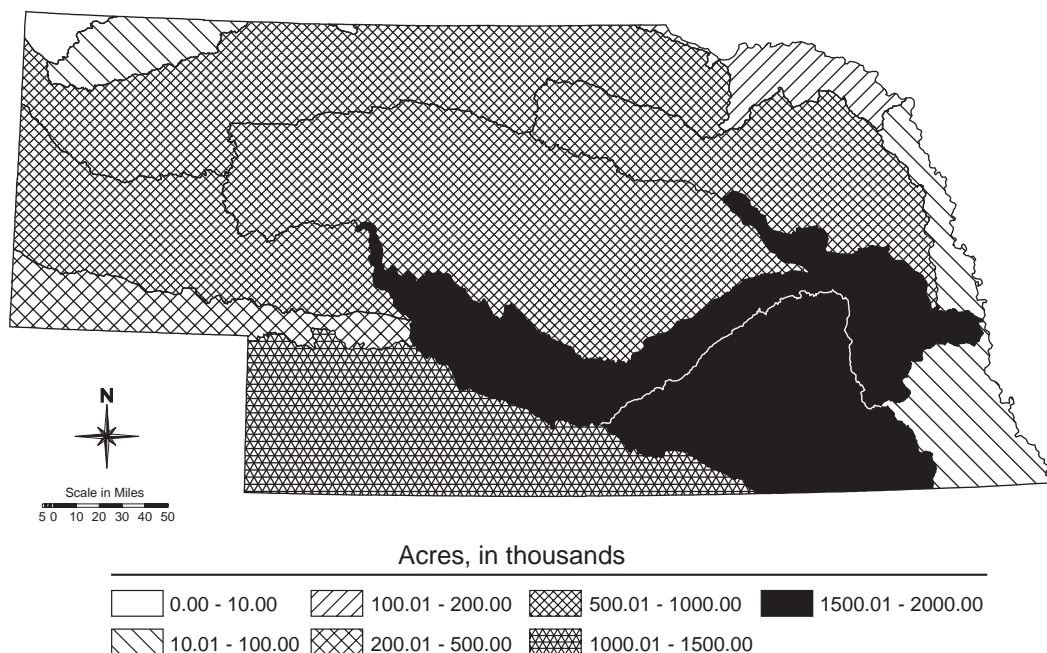


Figure 28
Estimated Irrigated Acres
in Nebraska, by Subregion, 1995



Irrigated crops included corn for grain and silage, popcorn, sorghum, soybeans, wheat, oats, barley, rye, proso millet, sugar beets, sunflowers, dry edible beans, alfalfa and other hay, and pasture. The National Agricultural Statistics Service (NASS) reported 5,450,700 acres of irrigated corn, making it the principal irrigated crop grown and harvested in Nebraska during 1995 (NASS, Internet homepage @ <http://www.usda.gov/nass/>). This was 73.2 percent of the total irrigated acres in the state and was more than five times greater than irrigated soybean acres. Soybeans were the second largest irrigated crop, with 963,700 acres.

Water used during the 3 to 4 month irrigation season in 1995 was estimated to be 7,842,900 acre-feet, which equals 6,996.38 Mgal/d if averaged over an entire year. Water use ranged from 0.80 Mgal/d (900 acre-ft) in Richardson County to 293.01 Mgal/d



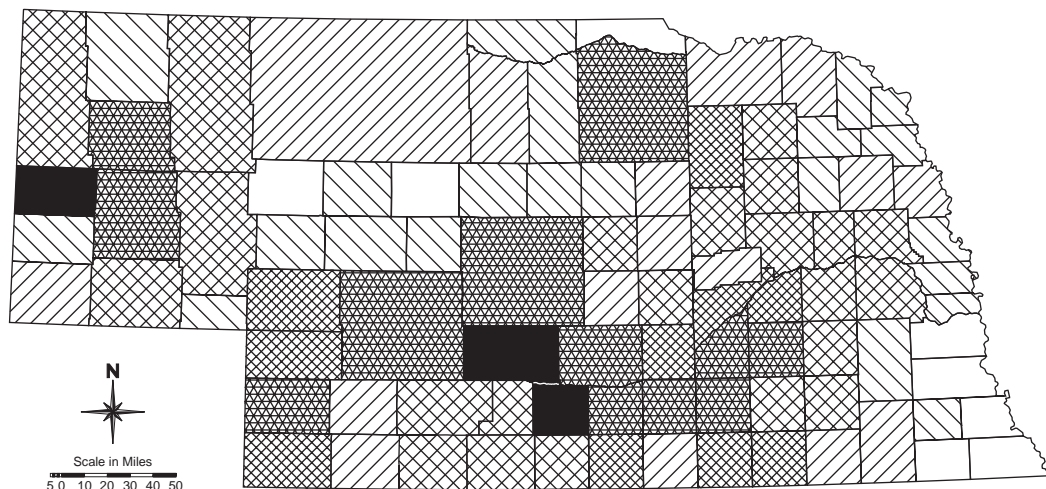
(328,500 acre-ft) in Dawson County. Water used for irrigation by HUC ranged from <0.01 Mgal/d in HUC 10120106 to 788.31 Mgal/d (883,700 acre-ft) in HUC 10200101. Estimated water use for irrigation by county is given in table 11 and by HUC and subregion in table 12. Ranges in water use for irrigation are shown by county in figure 29 and by subregion in figure 30.

The estimated amount of acres irrigated was about 589,000 acres greater in 1995 than in 1990, and nearly equal to the 1985 estimate. The estimated application rate was also greater than in 1990, so the volume of water used is substantially greater in 1995 than in 1990. The irrigation water use in 1995 was only about 300,000 acre-feet less than in 1985.

Surface-water withdrawals provided 1,219.78 Mgal/d, or 17.4 percent, of the total irrigation water use. Surface-water use ranged from none in Arthur, Grant, McPherson, and Perkins Counties to 244.07 Mgal/d (273,600 acre-feet) in Scotts Bluff County (table 13). It ranged from none in HUCs 10120106, 10190012, 10190017, 10210002, and 10250003 to 388.73 Mgal/d (435,800 acre-feet) in HUC 10180009 in the North Platte River Basin (table 14). Surface-water use is shown in figure 31 by county and is shown in figure 32 by subregion.

Withdrawals from ground water provided 5,776.60 Mgal/d for irrigation, 82.6 percent of all water used for that purpose. Ground-water use ranged from about 0.11 Mgal/d (100 acre-feet) in Pawnee County to 225.06 Mgal/d (252,300 acre-feet) in York County (table 15). It ranged from none in HUCs 10120106 and

Figure 29
Estimated Total Irrigation Water Use
in Nebraska, by County, 1995



Water Use, in million gallons per

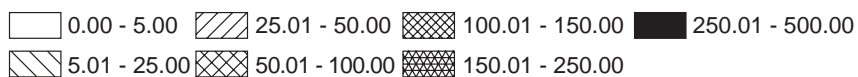
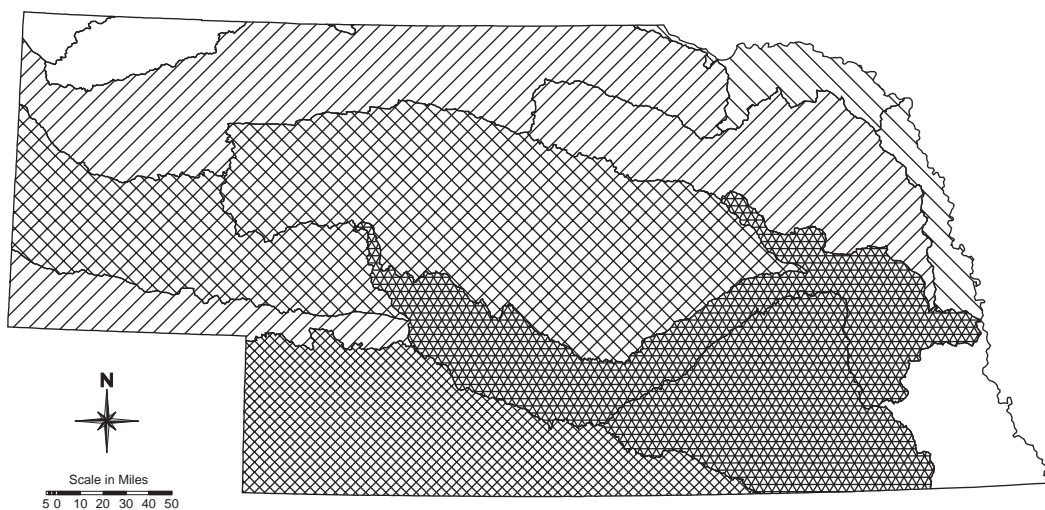


Figure 30
Estimated Total Irrigation Water Use
in Nebraska, by Subregion, 1995



Water Use, in million gallons per day

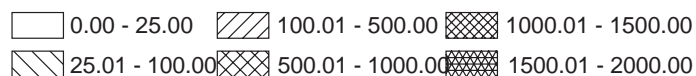


Figure 31
Estimated Irrigation Surface-Water Use
in Nebraska, by County, 1995

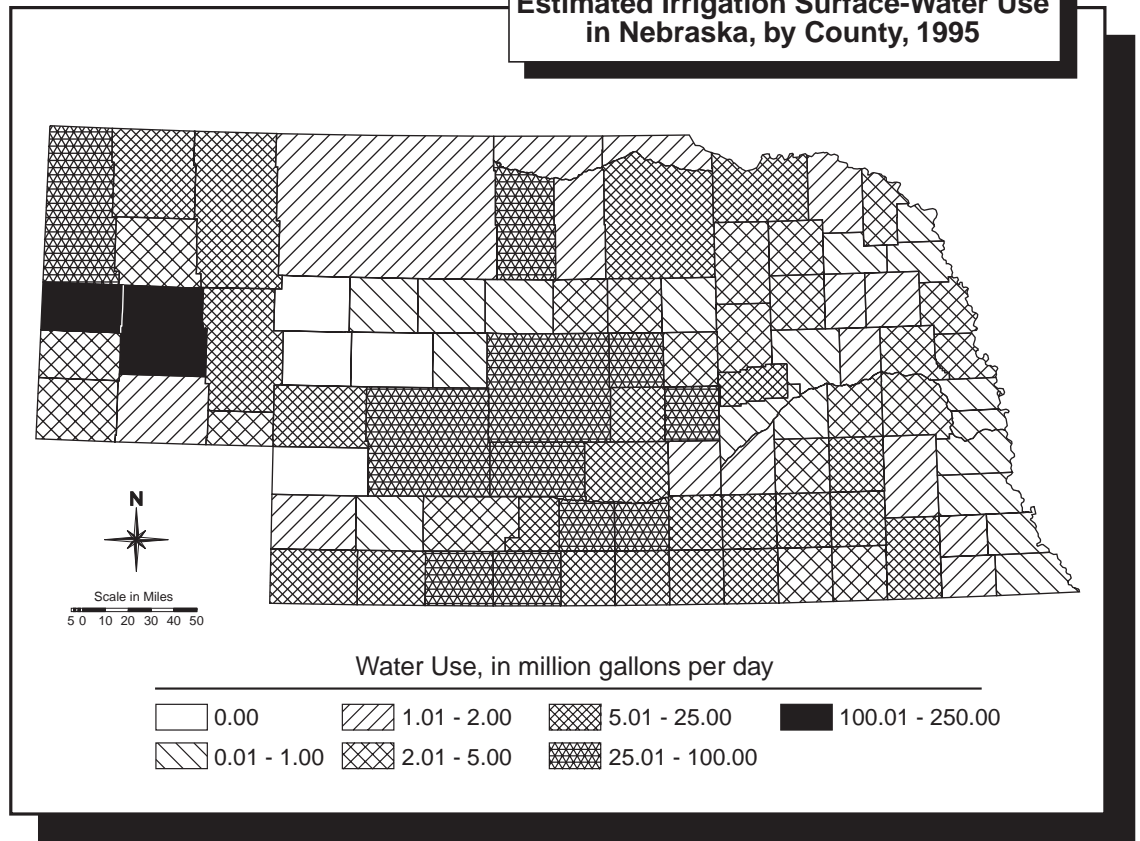


Figure 32
Estimated Irrigation Surface-Water Use
in Nebraska, by Subregion, 1995

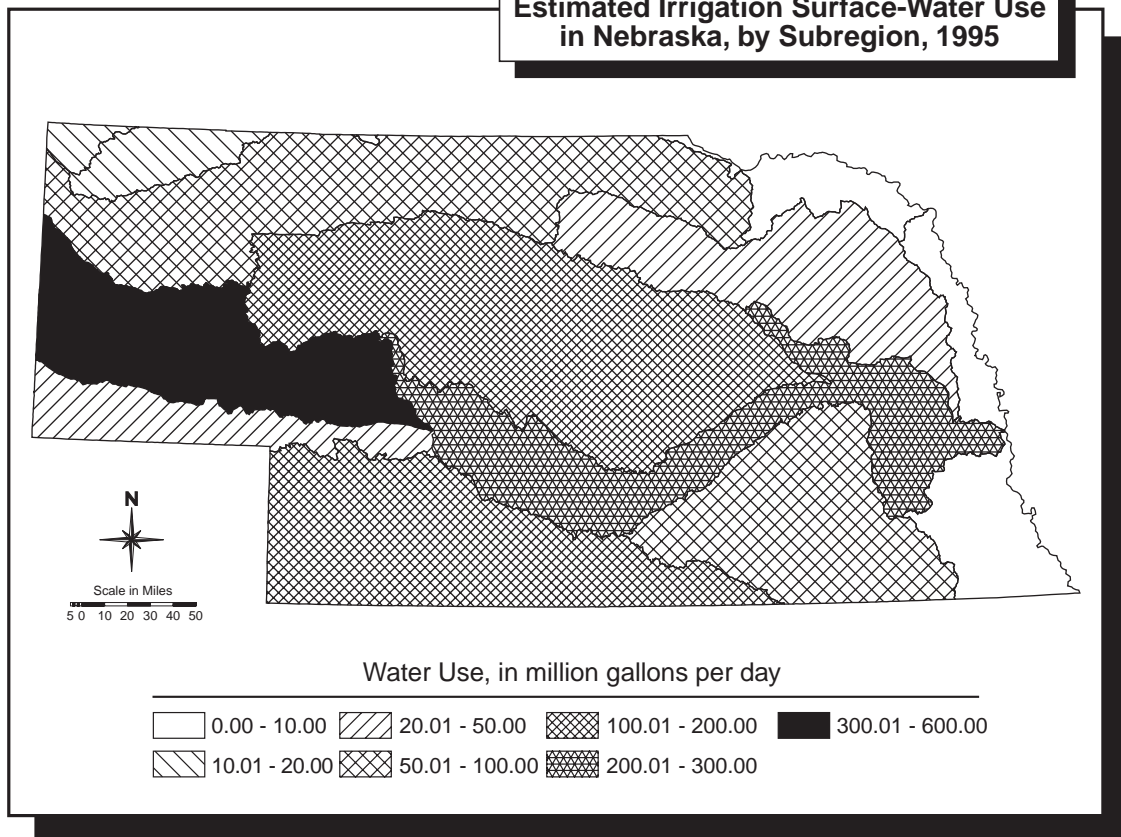


Figure 33
Estimated Irrigation Ground-Water Use
in Nebraska, by County, 1995

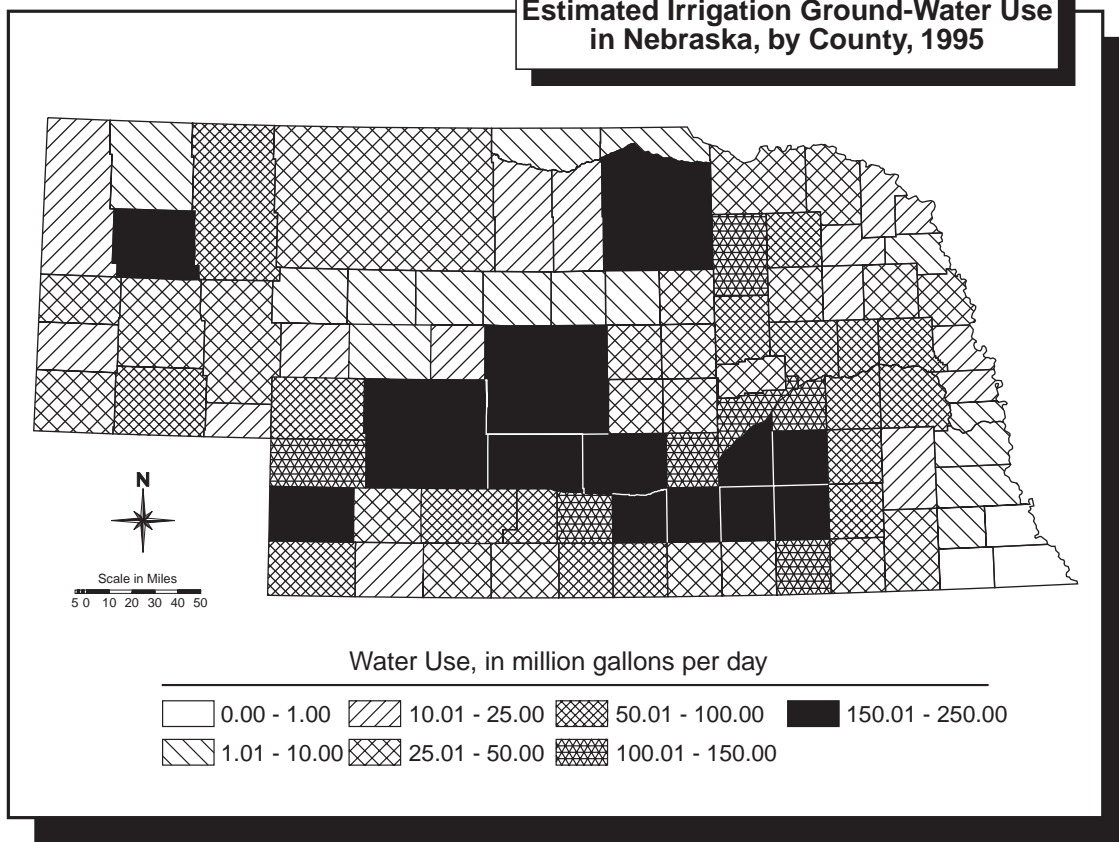
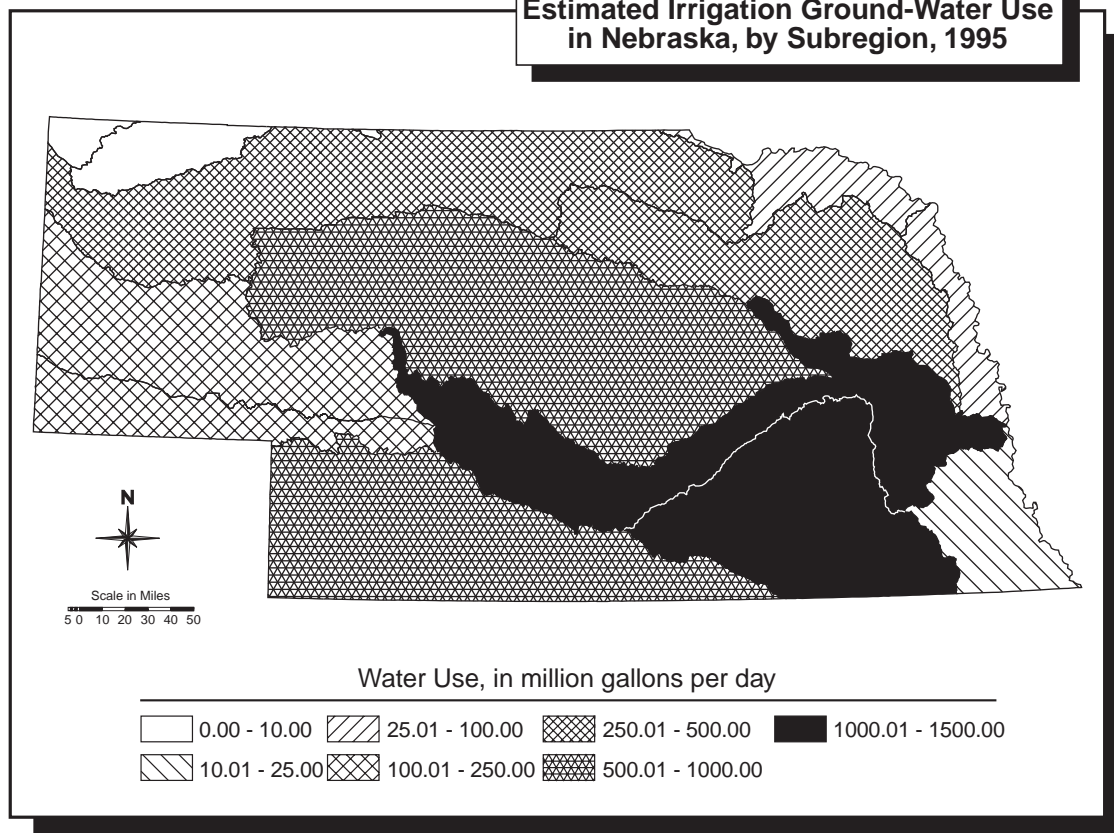


Figure 34
Estimated Irrigation Ground-Water Use
in Nebraska, by Subregion, 1995



10270205 to 569.22 Mgal/d (638,100 acre-feet) in HUC 10200101 in the Middle Platte River Basin (table 16). Ground-water use for irrigation is shown by county in figure 33 and by subregion in figure 34.

Total irrigation water use was estimated with data and computer programs from many sources. The estimated acres of irrigated crops were obtained from the NASS national data base for 1995 or the 1992 Census of Agriculture data (Nebraska Agriculture Census Internet homepage

@ <http://govinfo.kerr.orst.edu/cgi-bin/ag-state?Nebraska>).

Crops were grouped into four categories based on the amount of water consumed during growth: (1) high water requirement crops, including corn, sugar beets, and popcorn; (2) low water requirement crops, including dry beans, sorghum, soybeans, and sunflowers; (3)

hay, including alfalfa; and (4) small grains, including wheat, barley, oats, proso millet, and rye. Crop water requirements for the four categories were calculated using potential evapotranspiration (PET) and precipitation data for 34 daily weather stations across the state obtained from the High Plains Climate Center (University of Nebraska-Lincoln, High Plains Climate Center, precipitation and crop PET on-line data bases). Representative crops and planting dates at all stations were selected from this data and weekly crop reports [9]. Crop irrigation requirement (CIR) was calculated for the four categories of crops at all stations using daily data with a limit on effective precipitation because of infiltration capacity. To account for unusual soil moisture conditions, the irrigation demand (IrD) was calculated from the CIR and then adjusted with actual pumpage data (Upper



Republican Natural Resources District, 1996, crop acreage and ground water computer data base). The spring of 1995 was extremely cold and wet, so planting was late and high soil moisture further delayed the start of irrigation.

The percentages of each county irrigated from surface- and ground-water sources, surface-water irrigated land supplied by major irrigation districts, and land in each county irrigated by surface (flood) application and sprinkler methods were estimated with data from the DWR, Natural Resources Conservation Service (1992 national resources inventory computer data base), and Missouri Basin States Association [6]. These percentages and total crop acres were used to calculate the number of acres irrigated from surface- and ground-water sources by each application method.

County IrD for each crop category was calculated from the crop IrD, the percentages, and the efficiency of each method given in Steele [15]. Surface-water withdrawal was calculated as the sum of estimated private withdrawals and diversions to irrigation districts reported by DWR [10]. Private withdrawals were calculated by summing the surface water IrD in each crop category and multiplying by the private irrigated percentage. Ground water withdrawal was assumed to be equal to the ground water IrD.

Consumptive use for each county was calculated as the consumptive use by sprinkler applications plus the consumptive use for surface application methods. Sprinkler application consumptive use was assumed to be equal to the IrD. Consumptive use for surface application methods was calculated as the CIR plus the non-beneficial use of water losses because of the inefficiency of the method. Non-beneficial use was calculated as 15 percent of the efficiency losses, because it was assumed that the rest of surface-applied water returns to ground water or streams eventually [6]. County consumptive use of surface water was allocated to HUCs by the percentage of water rights, and ground water was allocated to HUCs by the percentage of irrigation wells in the HUC determined by the GIS.

Conveyance loss from canals was calculated from diversions reported by DWR adjusted for losses in Wyoming, Colorado, and Kansas, concurrent use for power and recreation, and reservoir losses. Conveyance loss was equal to the adjusted diversion minus district demand. Losses were allocated to counties and HUCs in proportion to the length of canal in them. The consumptive use and conveyance loss may occur in a different county or state than the diversion.

LIVESTOCK AND ANIMAL SPECIALTIES WATER USE

Livestock water use is defined as livestock watering, including feed lots and dairy operations, evaporation from stock ponds, and other on-farm needs. Livestock water as used here includes use for cattle, sheep, goats, hogs, and poultry. Animal specialties include water use associated with fish farms and the production of fur-bearing animals, and water use by other animals, such as horses, ponies, burros, donkeys, and mules.

The livestock and animal-specialty categories accounted for 141.90 Mgal/d, or less than 0.6 percent of the total water use in the State. Surface water supplied 33.26 Mgal/d (23.4 percent) of the livestock water used and ground water supplied 108.64 Mgal/d (76.6 percent). The range of water use by county is shown in figure 35 and by subregion in figure 36. Estimates of livestock and animal specialties water use by county and by HUC and subregion are given in tables 17 and 18, respectively.

Figure 35
Estimated Total Livestock and Animal Specialities
in Nebraska, by County, 1995

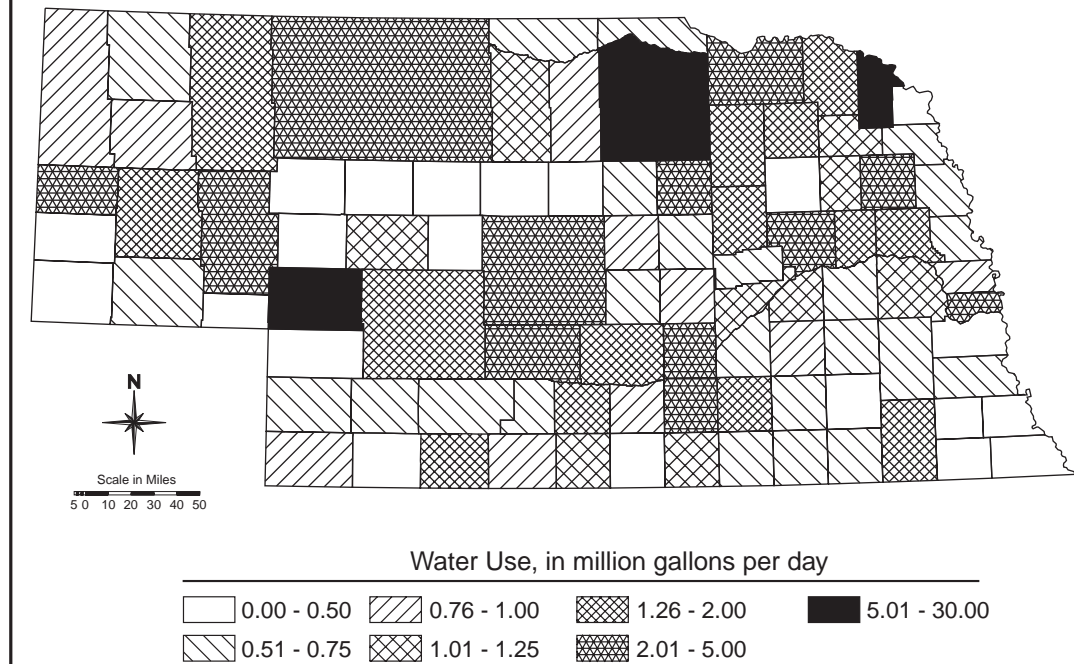
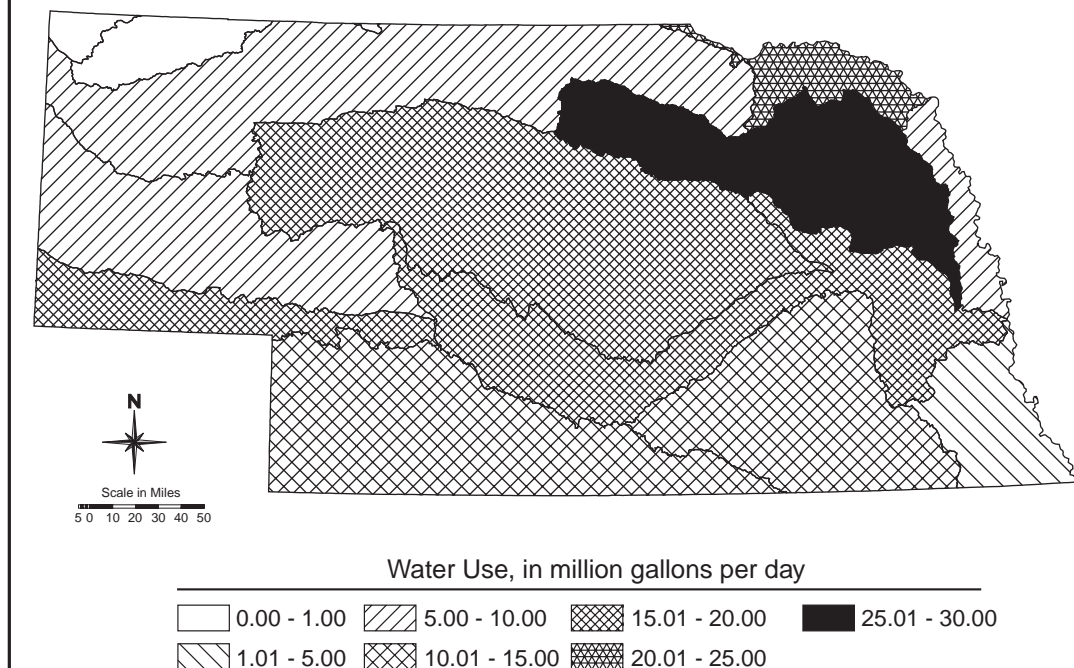


Figure 36
Estimated Total Livestock and Animal Specialities
in Nebraska, by Subregion, 1995



Estimates of the number of cattle and hogs in each county in 1995 were obtained from a national data base (NASS Internet homepage @ <http://usda.mannlib.cornell.edu/cgi-usda/agency.cgi?nass>). Numbers of other livestock, including horses and other specialty livestock, were estimated using data from the 1992 Census of Agriculture (U.S. Department of Agriculture, Nebraska Agriculture Census Internet homepage @ <http://govinfo.kerr.orst.edu/cgi-bin/ag-state?Nebraska>). Water use was estimated by multiplying the number of animals in each class by the number of gallons per day per head used by that class as listed in table 19. Total livestock and animal specialties water use by county was determined by summing the water used by each animal class. Using data from the 1971 Report on the Framework Study for Nebraska's State Water Plan it was assumed that surface water supplied 19 percent and ground water supplied 81 percent of water use for this category in each county. Water use by HUC was estimated by assuming uniform livestock and animal specialties distribution in rural areas of each county. The rural area percentage of each HUC was multiplied by the total livestock and animal specialties water use in each county, and then the portions of each HUC were summed.

A list of private aquaculturists (fish farms) obtained from the Nebraska Game and Parks Commission identified sites by county. Water use was estimated by owners/operators in telephone surveys in 1991 and 1996.

POWER GENERATION WATER USE

Estimated 1995 water use for power generation was 17,354.26 Mgal/d or 68.8 percent of the total water used for all purposes; more than 99.9 percent was from surface water (tables 20 and 21). Power generation was 24,450.56 gigawatthours (Department of Energy, electronic commun., 1996). Water use for this category was divided into three types of power generation: hydroelectric, fossil fuel, and nuclear. Data obtained from public power districts indicated that no water for hydroelectric power generation was used consumptively, and less than one percent of the cooling water used for fossil-fuel and nuclear-power generation was used consumptively.

Hydroelectric-power generation is supplied entirely by surface water. The 15,001.23 Mgal/d of water used produced 1,041.54 gigawatthours of power (table 22). This was 86.4 percent of the water used for



power generation and only 4.3 percent of the power produced. As in 1990, one-half the water used and one-half the power produced at Gavins Point Dam on the Missouri River was included in Nebraska totals. The other half of the water used and power produced at that location was reported by South Dakota.

Fossil-fuel power generation used 1,296.97 Mgal/d of water and produced 16,285.75 gigawatthours. This was only 7.5 percent of the water, but 66.6 percent of the power produced (tables 20 and 23). All except 4.43 Mgal/d was supplied by surface water; public water systems supplied 0.01 Mgal/d of the ground water used. Ground water was used at small powerplants that were brought on-line to meet peak power demands.

Water use data were used as reported to estimate use by county and HUC, and with generation data to develop regression equations for estimating use at sites where no reports were available. Data on power generation in 1995 were available for all power plants. The USGS 1990 data files were used to determine if surface or ground water was used.

Nuclear-power generation at the two plants in Nebraska used 1,056.06 Mgal/d and produced 7,123.27 gigawatthours of electricity. This was 6.1 percent of the water used for power generation and 29.1 percent of the power produced.



WASTEWATER TREATMENT RELEASES

This use category includes water returned to the hydrologic system by publicly-owned wastewater treatment facilities. Estimated wastewater return flows were 180.93 Mgal/d in 1995 (tables 24 and 25). It was estimated that 1.00 Mgal/d of wastewater treated by publicly-owned facilities was reclaimed for irrigation of crops and pasture. The range of estimated wastewater treatment releases by county is shown in figure 37 and by subregion in figure 38.

The U.S. Environmental Protection Agency's STORET data base was used to identify publicly owned wastewater treatment facilities that discharge to surface water and their discharge (Nebraska Natural Resources Commission Data Bank: Surface and Groundwater Quality data base at <http://nrnt2.nrc.state>).

Figure 37
Estimated Wastewater Treatment Releases
in Nebraska, by County, 1995

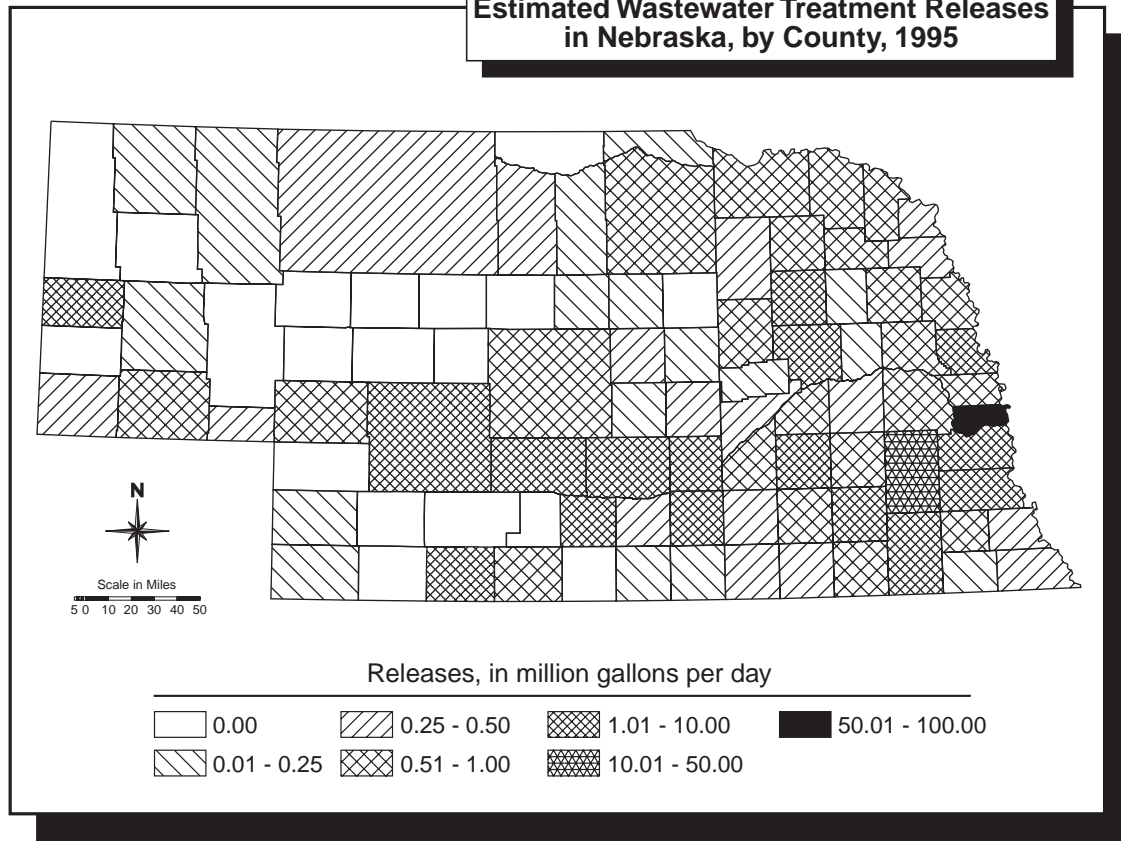
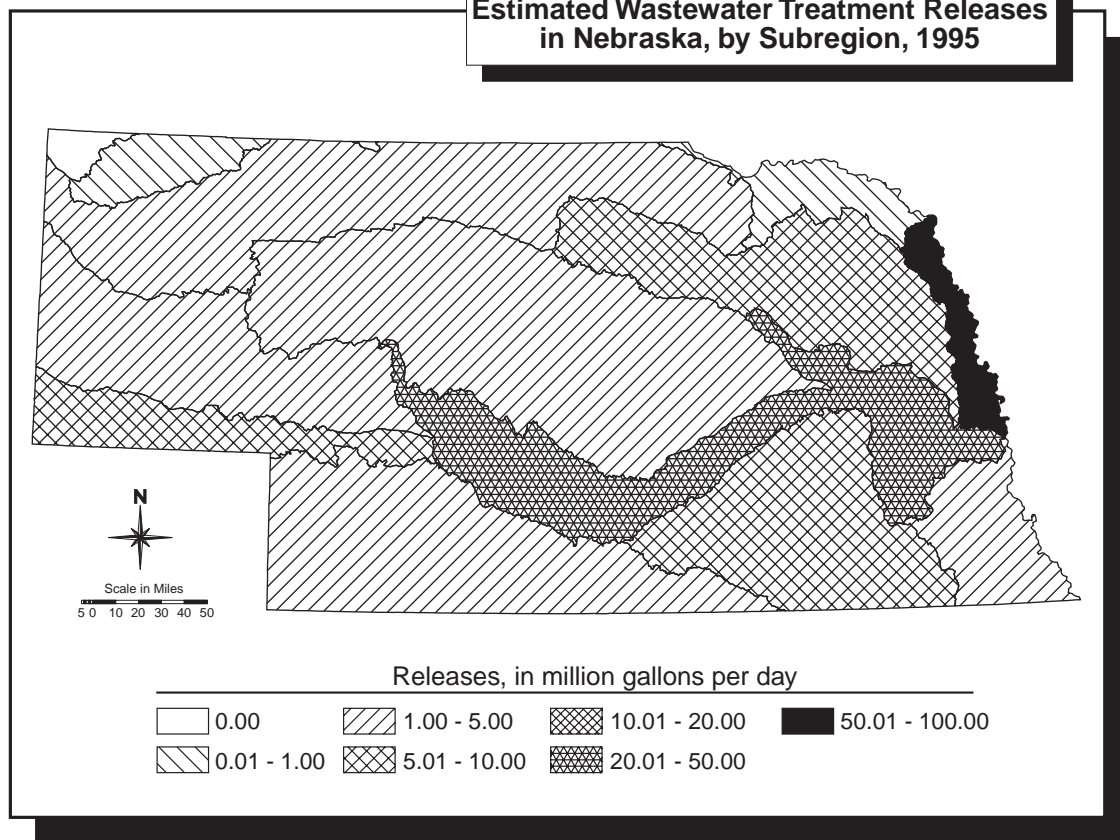


Figure 38
Estimated Wastewater Treatment Releases
in Nebraska, by Subregion, 1995



ne.us/cgi-win/tabular.exe). It also was used to identify self-supplied industries with discharge permits. The facilities that reclaim a portion of their discharge, were determined from a personal computer data base developed by the University of Nebraska-Lincoln [4].

Estimated discharge by county and HUC from publicly-owned facilities was calculated using reported discharges in the STORET file, or as two-thirds of total DIC deliveries plus self-supplied industries' discharge. Reclaimed wastewater was all used for irrigation, which usually occurs during a 4 month season, so the amount actually reclaimed was estimated as 25 percent of the facilities discharges for municipalities that reclaim wastewater (Susan K. Hoppel, Department of Environmental Quality, oral commun., 1996)

RESERVOIR EVAPORATION

Reservoir evaporation is a consumptive use associated with the storage of water for many uses, including irrigation, power generation, flood control, recreation, and fish and wildlife. Estimates in this report include only water lost by evaporation from reservoirs that have a

normal storage capacity equal to or greater than 5,000 acre-ft. Normal capacity is defined as the total volume of water in a reservoir below the conservation pool level, including dead storage but not flood control or surcharge storage.



Total evaporation from reservoirs was estimated to be 275,130 acre-ft (245.45 Mgal/d). Reservoir evaporation is shown by hydrologic subregion in table 26.

In 1995, 26 reservoirs met the capacity requirement. Evaporation was reported by agencies maintaining individual reservoirs, or was estimated for reservoirs for which only surface-area data was available [13]. Evaporation rates were estimated from National Oceanographic and Atmospheric Administration pan evaporation data and coefficients [2].

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1733 Estates Associates	Village of Burchard	Village of Dixon	Village of Hemingford
Village of Abie	Village of Burr	Village of Doniphan	City of Henderson
City of Ainsworth	Village of Byron	Village of Dorchester	Village of Henry
City of Albion	Village of Cairo	Village of Dunbar	Village of Hickman
Village of Alda	Village of Callaway	Village of Duncan	Village of Hildreth
Village of Allen	City of Cambridge	Village of Dunning	City of Holdrege
City of Alma	Village of Campbell	City of Edgar	Village of Homer
Village of Alvo	Village of Carleton	City of Elkhorn	City of Hooper
Village of Amherst	Cass Co. Rwd #1	Village of Elm Creek	Village of Hordville
Village of Arcadia	Cass Co. Rwd #2	Village of Elmwood	Village of Hoskins
City of Arlington	Village of Cedar Bluffs	Village of Emerson	Village of Howells
Village of Arnold	Cedar-Knox Rwd	Village of Endicott	Village of Hubbard
Village of Ashton	City of Central City	Village of Eustis	Village of Hubbell
City of Atkinson	Village of Ceresco	Village of Exeter	City of Humboldt
Village of Atlanta	Village of Chambers	Village of Fairmont	City of Humphrey
Sky Ranch Acres	City of Chappell	City of Falls City	City of Imperial
Stanton Sid #1	Village of Chester	Village of Farnam	Village of Ithaca
City of West Point	Village of Clarks	Village of Filley	Village of Jansen
City of Auburn	City of Clarkson	Village of Firth	Village of Johnson
City of Aurora	City of Clay Center	City of Fort Calhoun	Johnson Co. Rwd #1 East
Village of Avoca	Clearview Utilities Corp.	City of Franklin	Johnson Co. Rwd #1 West
Village of Axtell	Village of Cody	City of Fremont	City of Kearney
Village of Bartley	Village of Coleridge	City of Fullerton	Village of Kennard
Village of Bazile Mills	College View Park	Village of Garland	Village of Kilgore
City of Beatrice	Village of Colon	City of Geneva	Lakeside Trailer Court
City of Beaver City	City of Columbus	City of Genoa	Lancaster Co. Rwd # 1
Village of Beaver Crossing	Village of Concord	City of Gering	Village of Leigh
Village of Bee	Village of Cook	Glenhaven Village Subdivision	City of Lexington
Village of Beemer	Country Meadows Subdivision	City of Gordon	Village of Liberty
Village of Belden	City of Cozad	City of Gothenburg	City of Lincoln
Village of Belgrade	City of Crawford	Village of Grafton	Village of Lindsay
Village of Bellwood	City of Crete	City of Grand Island	Village of Litchfield
Village of Benedict	Village of Crofton	City of Grant	Little Blue Nrd Rwd #1
City of Benkelman	Cuming Co. Rwd #1	Village of Greenwood	Village of Loomis
City of Blair	City of Curtis	Village of Gresham	Village of Louisville
City of Bloomfield	City of Dakota City	City of Gretna	City of Loup City
Village of Bloomington	Village of Dalton	Village of Guide Rock	Mackel Trailer Court
City of Blue Hill	Village of Danbury	Village of Gurley	City of Madison
Village of Boelus	Village of Dannebrog	Village of Haigler	Village of Madrid
Bow Valley Water Works	City of David City	Village of Hampton	Village of Magnet
Village of Bradshaw	Dawes Co. Rwd # 1	Village of Hardy	Village of Malcolm
Village of Brainard	Village of Daykin	Harrisburg Village	Village of Malmo
Village of Bristow	Village of Decatur	City of Hartington	Village of Manley
Village of Brock	Village of Denton	City of Harvard	Village of Marquette
Village of Brownville	City of Deshler	Village of Hayes Center	Village of Martinsburg
Village of Brule	Village of Diller	City of Hebron	
Village of Bruning	Village of Dix		

Village of Maxwell	City of Pierce	Village of Stapleton
City of Mccook	Village of Pilger	Village of Steele City
Village of Mccool Junction	City of Plainview	Village of Steinauer
Village of Mead	Village of Platte Center	Village of Stella
Village of Memphis	City of Plattsmouth	Village of Stratton
Village of Merna	Village of Pleasanton	City of Stromsburg
Metropolitan Utilities District	Village of Plymouth	Village of Stuart
City of Milford	Village of Polk	City of Superior
Village of Miller	City of Ponca	City of Sutton
Village of Milligan	Village of Potter	City of Syracuse
City of Minatare	Village of Prague	Village of Talmage
City of Minden	City of Randolph	City of Tecumseh
City of Mitchell	Village of Republican City	Village of Terrytown
Village of Morse Bluff	Richardson Co. Rwd # 2	Village of Thedford
Village of Murdock	Village of Rising City	Village of Thurston
Village of Naponee	Village of Riverdale	Village of Tilden
City of Nebraska City	Village of Rosalie	Village of Trenton
Village of Nehawka	Village of Roseland	Village of Trumbull
City of Neligh	Village of Royal	Village of Unadilla
City of Nelson	City of Rushville	Village of Utica
Village of Newcastle	Village of Salem	City of Valley
Village of Newport	Santee	Village of Valparasio
Village of Niobrara	City of Sargent	Village of Verdel
City of Norfolk	City of Schuyler	Village of Verdigre
City of North Bend	Village of Scotia	Village of Verdon
City of North Platte	City of Scottsbluff	Village of Waco
Village of Oakdale	City of Scribner	City of Wahoo
City of Oakland	City of Seward	City of Wakefield
Village of Obert	Sheens Mobile Home Park	Village of Wallace
Village of Oconto	Village of Shelby	Village of Walthill
Village of Odell	Village of Shelton	Village of Wauneta
Village of Ohiowa	Village of Shickley	Village of Wausa
Omaha Regency	Village of Shubert	City of Waverly
Village of Ong	Adams Co. Sid #1	City of Wayne
Village of Orchard	Cass Co. Sid #1	Village of Weston
City of Ord	Douglas Co. Sid #196	Village of Whitney
Village of Orleans	Douglas Co. Sid #254	City of Wilber
City of Osceola	Douglas Co. Sid #284	Village of Wilcox
City of Oshkosh	Douglas Co. Sid #285	City of Winnebago
City of Osmond	Douglas Co. Sid #296	Village of Winside
Village of Otoe	Dodge Co. Sid #3	Village of Winslow
Otoe Co. Rwd # 3	Sarpy Co. Sid #34	City of Wisner
Village of Overton	Saunders Co. Sid #6	Village of Wolbach
Village of Oxford	Sarpy Co. Sid #81	Village of Wood Lake
Village of Page	Sarpy Co. Sid #97	City of Wood River
Village of Palisade	City of Sidney	City of York
Village of Palmyra	Village of Silver Creek	York Mobile Plaza
City of Papillion	Skyline Woods Homeowners Assoc	Village of Yutan
Papio-Missouri River Nrd1	Village of Smithfield	
Papio-Missouri River Nrd2	Village of Snyder	
Papio-Missouri River Nrd3	City of South Sioux City	
City of Pawnee City	Village of Spencer	
Pawnee Co. Rwd # 1	Village of Sprague	
Village of Paxton	City of Springfield	
City of Peru	Village of Springview	
Village of Petersburg	Village of St. Edward	
Village of Phillips	Village of St. Helena	
	City of St. Paul	
	City of Stanton	

